

# THE IRON AGE

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## Breaking Down the Language Barrier

Teaching the Foreign Laborer to Speak English by a System of Instruction Cards—Method Applicable to Any Language

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In industrial work difference in language is found by some progressive men to be a cause of accidents, a barrier to good work and a frequent occasion of misunderstandings and strikes. On the whole, however, the subject has not been given much consideration, although the fact that there are millions of foreign employees in the factories of the United States who do not understand English shows that the language problem must be one of considerable importance. It will be understood that most of these immigrants are illiterate in their own language and that education in English, except of the most elementary character, is prohibitive not so much because the laborer may be of low intelligence as because his potential earning value, as far as the employer is concerned, must necessarily be small.

At this period of changing industrial conditions it may be worth while to examine critically the relation between the language problem and economic production, a phase in scientific management hardly

considered as yet. Think of a large factory with nearly nine-tenths of the employees foreigners and not an interpreter in the place. Consider another case with no foreign-speaking foreman and no English-speaking workmen both just blundering through their jobs. Such conditions are mere symptoms that the vast proportion of employers have never considered language difference in relation to the efficiency of common labor. It is time they should, for

if there is a large influx of "green" men at the termination of the war it will be more necessary than ever to secure efficiency owing to the shortened working day secured under the stress of "war orders." If motion study, scientific management, speeding up and other phases of intensive effort are being tried it would seem that the relation of the language problem to such activities ought not to be neglected.

A few inquirers who have given the subject thought claim that the workmen lose 10 per cent efficiency through ignorance of English. To an employer with a million-dollar payroll this is, or ought to be, a serious statement if he relies principally on foreign labor for his production. Inquiry will show that there are many circumstances illustrating how language differences retard work. Of course there will always be a few employers to congratulate themselves on the inability of labor to express itself fluently, but on the whole and looking at the matter from an exclusively selfish point of view, it will be

found that some means of communication between the workman and the employer will be a substantial gain to all concerned.

Various attempts have been made to overcome the difficulty, as, for instance, by teaching English in evening, part-time, industrial or camp schools, either grammatically or phonetically, through the medium of English or the workman's tongue, during or outside shop hours, by hired teachers or volun-

### Polish — for English speakers.

English.	Polish pronounced in English.
<b>SALUTATION.</b>	
Good morning.	Jane dubry.
Good night.	Dobranota.
Please.	Proshe.
Thank you.	Jenkuye.
<b>TIME.</b>	
I have no time.	Nee mam chasu.
Soon.	Niedwugo.
To-morrow.	Yutro.
Yesterday.	Vchuray.
Noon.	Powudnie.
<b>QUANTITY.</b>	
Enough.	Doaych.
Small.	Mawo.
Large.	Dujq.
<b>ENQUIRY.</b>	
Why?	Chemu.
When?	Keday.
Where?	Gzie.
How?	Tak.
How much?	Eyleh.
<b>APPROVAL.</b>	
That is good.	Toe yest dobję.
All right.	Dobję.
Excellent.	Bardso dobję.

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The Foreman's Card Giving the Common English Phrases and the Pronunciation of the Polish Equivalent in English

### Po angielsku — dla polskich mówców.

Po polsku.	Tak się wymawia po angielsku:
<b>POZDROWIENIA.</b>	
Dzień dobry	Gud mornying
Dobranoc.	Gud naft.
Proszę.	Pliz.
Dziękuję.	Tenk ju.
<b>CZAS.</b>	
Nie mam czasu.	Aj hew no tajm.
Niedługo.	Sun.
Jutro.	Tumaro.
Wczoraj.	Jesterdej.
Południe.	Nun.
<b>IŁOŚĆ.</b>	
Dosyć.	Inof.
Mało.	Smol.
Dużo.	Lardż.
<b>ZAPYTANIA.</b>	
Czemu?	Uaj.
Kiedy?	Uen.
Gdzie?	Uer.
Jak?	Hau.
Ile?	Hau moez.
<b>POTWIERDZENIA.</b>	
To jest dobrze.	Dat is gud.
Dobrze.	Oli rat.
Bardzo dobrze.	Ekselent.

— 2 —

The Workman's Card with Every-Day Words of Polish Tongue and the Phonetic Rendering of the English Equivalent in the Foreign Sound Value.

teers. All of these methods or modifications of them have been tried and their usefulness has been demonstrated under suitable conditions. Any, or every one, of these plans may fail unless the conditions as regards type, nationality, the nature of the industry, its complexity and the grade of labor employed, are fully considered. If all the workmen speak the same foreign language it will be found best to teach English through the medium of the tongue which they understand, but this course is seldom possible because there are far more likely to be many different nationalities, in which case it appears to be more advantageous to teach men through the medium of English. This plan, which consists of making the learner forget his mother tongue as fast and as completely as possible, is a makeshift from the purely educational point of view, but it is applicable to the most common and varied types of labor. Its practicability and ease of accomplishment gives it an undoubted place among the various solutions now being considered.

Many employers object to the utilization of the working hours for teaching language, but this is a question to be settled according to the requirements of the case. It must be observed that unless an employer takes the initiative to improve his men they will make little effort to help themselves. This course involves, perhaps, the expense of a teacher, loss of working time, printing bills, upsetting shop routine and other incidentals, but in the long run the employer will be well rewarded. Some States are beginning to recognize their obligations in this respect; thus New Jersey provides for the instruction of foreign-born residents over 14 years of age in the English language. Until other States follow suit the obligation will be a burden on the shoulders of the employers who cannot but recognize that the English language is the foundation of industrial education through which agency alone progress can be made. The gradual increase in wages due to better work, resulting from industrial education, is the most potent factor in producing content among workmen. When this fact is fully appreciated other States will follow the lead of New Jersey. In the meantime it would seem best for the employer to do what he can.

A scheme, easy to try, economical and giving immediate results, is one which involves the training of the foreman alone, and through him the workmen, during the progress of the day's work. In this plan a selection is made of a limited number of phrases suitable for carrying on the most essential duties of a routine nature and no more. They are printed on stout cards, as illustrated, to stand hard usage in the factory. Immediately next the phrase is the phonetic rendering of the equivalent in the required foreign language. In other words, whether it happens to be Yiddish, German, Polish or Russian, it is translated in terms of English pronunciation, in English lettering, and can, therefore, be easily mastered by anyone able to read English. The workman is provided with a similar card containing the phrases in his own language, together with the phonetic rendering of English in the foreign sound value. This enables the user to become familiar with the language of the foreman, should he be so inclined.

For convenience all the phrases on the language cards are grouped under appropriate headings of salutation, time, quantity, inquiry, approval, command, direction, warning and number. The ultimate object, to teach English, must never be lost sight of by the foreman, and he is directed to use English as often as he uses the foreign phrase. It is important not to use the foreign language

any more than will enable the foreigner to understand the equivalent in English. As the foreman has the English phrase and its phonetic equivalent before him, it will be easy to use them in the same breath till such time as he is sure the workman will understand English alone. There is one obvious handicap to the scheme and that is where the races are mixed even under the control of individual foremen. This is unusual, because most foremen prefer, if possible, to deal with only one nationality. If there are not too many races the language problem, as far as efficiency in common laboring work is concerned, can be easily solved by this kind of "language card," and the foreman who is ready to seize the advantage of knowing how to talk a little to his men in a way they can understand, becomes eager to use the card until he is entirely familiar with its contents. The workman, for his part, one may be sure, is not sorry to bid good-bye to the shouting, cursing, gesticulating foreman. Thus the mutual education of the men goes on without loss of time or interruption of routine, without increase in cost, with fewer accidents, and all the while the scheme, besides undoubtedly promoting efficiency, is bringing a feeling of co-operation between the most widely divergent units of the working force.

### Improved Watch for Making Time Studies

M. J. Silberberg and associates, Peoples Gas Building, Chicago, Ill., have placed on the market an improved style of watch for making time and motion studies.



Time-Study and Time-Keeping Watch with New Indicating Features on the Face

As compared with the direct-reading watch, which was illustrated in THE IRON AGE March 25, 1915, the new instrument contains a number of changes. These include the addition of a regular set of works and hour, minute and second hands, thus enabling the watch to be used as an ordinary timepiece if desired.

This watch, which is known as the Master Chronograph, operates entirely from the crown, being of the stop, start and fly-back type. The timepiece portion of the

watch has seventeen jewels and in addition there are divisions in seconds and fifths for the time study feature. The figures on the extreme outside of the dial designate the number of operations that can be performed in an hour where the time for a single operation is less than 1 min., while the figures on the extreme inside of the dial, such as 51, 45, 40, etc., give the same information if the time required for a single operation exceeds 1 min., but is less than 2 min. In the accompanying illustration the watch is shown with the large black hand used in time-study work stopped at 13 sec. and by referring to the outer set of figures it will be seen that the hand is opposite 275, which is the number of operations that can be performed in 1 hr., assuming that 13 sec. is required for a single one.

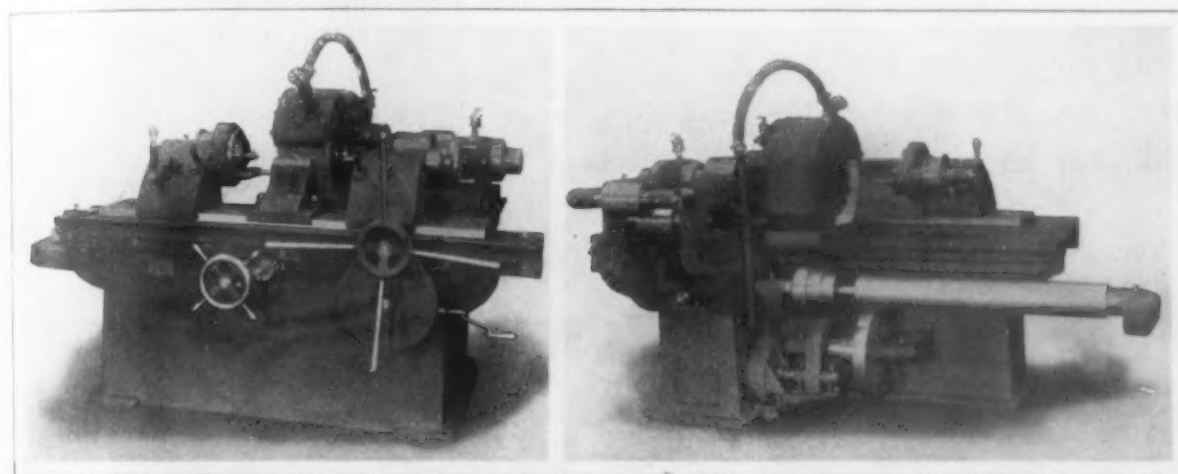
The Moore & Scott Iron Works, 678 Second Street, San Francisco, with shipyards at Oakland, Cal., is building for James Ralph, Jr., a freight boat to cost \$750,000. It will be of the Strath type, 397 ft. long, 52 ft. 3 in. beam, 28 ft. depth molded, and will have a carrying capacity of 7200 tons dead weight, and fitted to run with coal or oil fuel.

## Motor-Driven Form Grinding Machine

A grinding machine equipped with motor drive and admitting a wide-face wheel has been placed on the market by the Bridgeport Safety Emery Wheel Company, Bridgeport, Conn. It is designed for handling cylindrical work up to 10 in. in diameter and not over 32 in. long. If the surface to be ground is not more than 8 in. in length the work is not traversed, this, it is pointed out, making possible the grinding of formed parts and giving the machine the name of a form grinding machine, but if the surface to be finished exceeds the width of the wheel face, provision is made for traversing the work. The machine is equipped with either belt or motor drive, and if the latter arrangement is

clutch on the back gear shaft controlled by a hand lever located on the front of the headstock.

The grinding wheel head is also of heavy construction and is mounted on ways on an extension cast on the rear of the base. Bronze taper sleeve type bearings are used for the spindle and are opened and closed by screw collars on the end. Lubrication for the bearings is furnished by felt pads deriving their supply of oil from sight feed cups. The grinding wheel is 20 in. in diameter with an 8-in. face. It is mounted on a heavy spindle between safety collars. A pilot handwheel on the front of the base, which is back geared to a lead screw engaging a nut bolted to the under side of the grinding wheel head, moves the wheel toward and away from the work. Surrounding the lead



Front and Rear Views of a Motor-Driven Form Grinding Machine Having a Double-End Motor Mounted on the Floor and Driving the Work from the Long Drum Shaft at the Right while the Wheel Is Driven by a Belt Passing over the Wide Pulleys at the Left

employed the motor is provided with pulleys at both ends of the armature.

The work table is a heavy, solid casting mounted on the flat ways of a bed of heavy cabinet construction. The top of the work table has a wide flat bearing surface which is planed at right angles to the front, this arrangement being relied upon to give means for securing the horizontal and vertical alignment of the head and tail stocks which are clamped in place by bolts projecting at an angle from a T-slot in the table. A channel surrounds the work table to convey the water and sediment which pass from the work to a removable mud pan where the mixture settles, the water overflowing in a comparatively clean condition into the main water reservoir underneath, from which the water pump takes its supply. The mud pan is of such a size and shape as to be readily emptied from time to time as required. Where the work has to be traversed the power is transmitted from a hand-wheel at the middle of the bed, which operates a pinion meshing with a rack under the work table. The distance from the floor to the top of the work table is 32 in., and the floor space occupied measures 38 x 61 in.

Large, heavy castings are used for the bases of the head and tail stocks, which it is pointed out insure a long bearing contact with the table. The headstock spindle is 3 in. in diameter and that for the tail stock is 2½ in. in diameter, both being provided with holes for tapered centers. The headstock face plate for driving the work is provided with a set of back gears having a ratio of 3 to 1 and there is a bearing of bronze 9 in. long and 3½ in. in diameter in which the spindle revolves, the work thus revolving on two dead centers. The rotation of the work is stopped or started by a

screw and concentric with it is an adjustable stop with micrometer adjustment to limit the forward movement of the wheel to the work. This stop is operated independently by a worm and worm gear and it is emphasized that by making the stop concentric with the lead screw the danger of any side strain producing a change in the alignment of the grinding wheel is eliminated.

When the machine is provided with motor drive, the source of power is located behind the base. A pulley on one end of the motor armature drives the grinding wheel spindle directly through a wide endless belt, an automatic belt tightener and idler pulleys being relied upon to take care of changing conditions due to the wear of the wheel and its movement forward and backward. The pulley driving the work is located on the opposite end of the motor armature. From this pulley the power is transmitted through a belt to a back shaft from which power is transmitted to a three-step cone pulley. This pulley is mounted on the drum shaft, and from the other end a belt runs to the work pulley on the headstock. In this way three different work speeds are secured. The bearings of the drum and back shafts are bolted to the main base, and the latter supplies power to the pump employed in connection with the water system.

The weight of the machine boxed for domestic shipment is 5500 lb.

At a recent meeting of the stockholders of the Miami Iron & Steel Company, Hamilton, Ohio, the officers were re-elected, as follows: President, E. M. Peters; vice-president, J. C. Thoms; secretary and treasurer, E. C. Siemer. The company is making arrangements to blow in its Miami furnace at Coke-Otto some time in the spring.





## Remington Arms Plant, with Probably the World's Largest Factory Building, Erected in Eight Months



ONE and one-third million square feet of floor space under one roof—1,335,200 sq. ft., to be exact—probably constitutes the largest factory building ever built. In size alone the main building of the new plant of the Remington Arms & Ammunition Company, Bridgeport, Conn., establishes a new record. Yet more striking is the speed with which this huge structure was erected. The contractors began work March 7, 1915, and eight months later—Nov. 10—turned the building over to its owners. The work of clearing the site was begun Dec. 16, 1914, and the contracts signed Jan. 18, 1915.

The entire task was to build thirty-eight units, including a power plant, five forge shops and the main building which takes the form of thirteen manufacturing units whose axes are perpendicular to the main axis which runs through the center of the twelve connecting "service" units. Thus when one stands in the doorway of the bottom floor of the first unit he has an uninterrupted view, through corridors in the service units, to the far end of the building, 991 ft. distant. For travel about this building, the messenger boys use bicycles and roller skates.

The machine units are 61 ft. 1 in. x 274 ft. 5 in.; the service units, 50 ft. 1 in. x 77 ft. 11 in.; the whole building of a uniform height of five stories. Continuing from the last unit of the main building is a one-story service building of the same dimensions as the others, which leads to the dry-kiln, a one-story building, 94 x 272 ft. The entire plant is built of brick, steel and concrete, and bears evidence in all its details that its designers

were adepts in the art of planning modern industrial works.

The ground floors are made with 4 in. of tar rock concrete, 1 in. of tar and sand, 3-in. hemlock under flooring, and are surfaced with 1 7/8-in. x 3 3/4-in. maple. The other floors are constructed of 2 x 8-in. L. L. yellow pine on edge, two-ply damp-proofing, 7/8-in. x 5 1/4-in. spruce under-flooring, and 1 1/8-in. x 3 1/4-in. maple finish flooring. There are thirty-four windows, 10 ft. 3 in. x 13 ft. 2 in. (two windows in each bay), in each story of the machine units, and ten similar windows in each story of the service units. There are 144 lights of glass in each bay.

The lavatories and toilets and locker rooms are located on each floor of the service units, and are in keeping with the standards established in every part of this new plant. The noticeable thing is the arrangement of hot and cold water faucets, so that the men wash in running water of any temperature desired, doing away with the problem of keeping bowls clean.

There are five forge shops which extend in a long line beside the main building, and between it and Pembroke Lake, upon the shore of which is located the power plant. One of the forge shops is 64 x 192 ft., two stories. The other four are one-story, 64 x 352 ft. The combined area of the forge shops is 110,590 sq. ft. The smaller shop has twelve bays and the four larger each twenty-two bays. The work on the forge buildings was begun Dec. 16, 1914, and they were practically completed in June, 1915.

The power plant is a building





## Management of the Gigantic Bridgeport Development and Service Provisions for the 18,000 Employees

93 x 161 ft., 50 ft. high. The coal conveyor and storage is housed in a structure 68 ft. high. The power furnished is sufficient to supply a city of 150,000 people with light and heat. The first turbine was started in operation July 10, 1915.

There is also an employment building, a large barracks clubhouse for the guards, seven transformer buildings, and a garage. The illustrations show how quickly and thoroughly the evidences of construction were swept away and the grounds made attractive.

In the construction of this huge plant there were used 15,000,000 board feet of lumber, 11,500 tons of structural steel, 20,000 cu. yd. of concrete, 18,000,000 bricks, 160,000 lb. of putty, 1930 plumbing fixtures and 273 drinking fountains.

The total floor area is 1,538,000 sq. ft. and the window area is 350,000 sq. ft. The plant and its equipment represents an investment of approximately \$12,000,000.

It is difficult to grasp at once the scope of the various production departments. To say that a thing is the largest in the United States has become trite and almost meaningless in these days of huge accomplishments and large projects, but no other phrase can be used to express the size of the Remington crews of tool makers, drop forgers and die sinkers. When the shops are fully manned there will be 2000 in the tool rooms. It is stated that there will be more cutter makers alone than are now employed by any factory specializing in the production of cutters. There will be over 400 men on the drop-hammers and the largest die-

sinking department maintained by any single industrial plant.

### THE MANAGEMENT IS GOVERNMENT TRAINED

The man directly responsible for the building up of this great organization and for the proper co-operation and co-ordination of the manifold activities that are working together to make it an efficient organization, is Walter Grant Penfield, who resigned March 1, 1915, from the ordnance department of the United States army with the rank of major to become the works manager of the Remington Arms & Ammunition Company. Nov. 8, 1915, he was made works manager of both the Remington company and the Union Metallic Cartridge Company, Bridgeport, which is owned by the same interest. Major Penfield has had a most unusual training for industrial works management. Born in East Berlin, Conn., he graduated from Sheffield Scientific School, Yale University, in 1896. After two years as assistant to the bridge engineer of the New York, New Haven & Hartford Railroad, he enlisted as a private in the Spanish War, and rose to the rank of second lieutenant. He was appointed to the regular army with the same rank in 1899, and served in Cuba and the Philippines. In 1892 he was transferred to the ordnance department with the rank of lieutenant, was made a captain in 1906 and a major in 1909. While in the army, Major Penfield had charge of the civil reconstruction of Cuba west of Havana, and later was chief engineer of the islands of Leyte and Samar in the Philippines. From

May, 1907, to October, 1914, he was in charge of the shops at the Springfield Armory, going from there to the Frankford Arsenal as officer in charge of the manufacture of artillery ammunition.

The works manager of the Remington Arms & Ammunition Company is C. C. Sheppard, who resigned March 20, 1915, from the ordnance department of the United States army to become shop superintendent of the Remington company. Captain Sheppard was born in Morris, W. Va., Sept. 27, 1887, and was graduated from West Virginia University with the degree of B.S.M.E. in 1909. Later in the same year he entered the army as a second lieutenant in the Coast Artillery Corps. In 1910 he became a first lieutenant in the ordnance department, and was promoted to captain in the ordnance department in 1912. His army service included tours of duty at Boston and New York Harbors, two years at the Springfield Armory and two years at the Sandy Hook proving grounds. Captain Sheppard was made assistant works manager in October and succeeded Major Penfield as works manager at the Remington plant when the latter was made general works manager last November.

#### THE TASK OF HIRING 18,000 MEN

There are few experienced manufacturers who would welcome the task of filling the Remington plant with help—18,000 hands will be the ultimate working force, of whom a very large proportion must be skilled men—at the rate of 2000 a month. Here was abundant opportunity for one of the new profession of employment experts, and the choice fell upon Edward W. Carpenter. He had had good experience in employing men for engineering work, with which he first became connected in 1893. In after years he became a superintendent of railroad construction crews, and in this capacity became familiar with the different types of laborers in most of the States. When a group of the leaders of big industries decided to establish a labor exchange by which industries in many sections could recruit labor from the great center of supply—New York—Mr. Carpenter was selected to organize and manage the enterprise. For seven years he has specialized in this field, supplying all classes of industry with technical men and skilled hands.

At the Remington plant a commodious building is devoted solely to the work of the employment department. The building has several entrances which open directly into reception rooms. One of the guards is always stationed outside the building and sorts the applicants according to four general divisions, directing each man to the proper door.

The first general division is for foremen, engineers, draftsmen and office employees; the second for skilled mechanics, such as tool makers, die sinkers and fitters; the third for ordinary machinists, drill and milling machine hands, polishers, etc.; the fourth for unskilled laborers. A corps of examiners, specially selected because of their personal skill in and knowledge of the crafts for which they do the interviewing, make it difficult for an applicant to pose as of a higher grade than he really is. No small part of the examiner's task, however, is to make sure that no man is turned away who really is competent but lacks the facility with words necessary to express his real knowledge.

Every man hired by the company goes through the employment department, and only in rare instances does an executive or foreman do any interviewing. Thus the foreman is free to devote his whole time to supervision. The employment department sets the rates, and men are transferred from one department to another only when the transfer is satisfactory to the heads of both departments. Such exchanges are not usually referred to the employment office except as matters of record.

A large staff of clerks is necessary to keep the employment records and files in order. These are very complete. The files are so arranged that applications which cannot be accepted when received come up automatically when the call comes for help of that particular class. The correspondence of the employment office is heavy, and about 10,000 applicants are interviewed personally each month.

There is much discussion these days of the turnover of the human element in industry. Men have discovered the high cost of hiring from 1000 or 2000 men a year to maintain a working force of 600. The Remington employment office in November, 1915, hired 2181 men of whom seventy-one proved incompetent. That is three out of 100. Only 1½ per cent of the total force of employees (about 5000 at that time) was discharged in November for in-



About 500 applicants are interviewed each day in this employment building. A guard sorts out the applicants according to the grade of work which they are seeking and points out to them the proper door to enter. There are four reception rooms for different classes of labor.

competency, and only 4 per cent for all causes—violations of rules, smoking, insubordination, absence without leave or notice, etc. A report made at the close of the year showed that 90 per cent of all employees who had come with the company six months before were still in its employ. The officials regard this as a satisfactory showing for an organization hardly yet out of the primary stages of formation. The schedule for plant equipment calls for the hiring of at least 2000 men each month, and the requirements are being met by the employment office.

An apprentice course, extending over four years, has been planned and a start has been made with a group of young men. This is now in a formative stage, but when fully developed it is expected that at least 250 boys will be in training at all times. The course as outlined is designed to make a boy skilled both on the usual machine tools and on the special machines employed in rifle manufacture.

#### FEEDING 6000 MEN IN HALF AN HOUR

The company has spent about \$40,000 to secure the facilities to feed its army of employees. The cafeteria system is employed, and the top floor of one of the middle units is entirely devoted to this use. The seating capacity of the room is 620, and broad shelves about three sides of it furnish standing room for 200 more. The tables have opaque glass tops and the "bentwood" chairs are of the sturdiest type. There are four water stations with two faucets each. All the drinking water throughout the plant is cooled by a large refrigerating system. There are four racks of cutlery and napkins at different points on the center aisle. These are of a design originated by the Vannoy-Inter-State Company, which operates the luncheon service. Large racks for glasses are near each water station.

There are two service counters, each equipped with the latest devices, such as self-percolating coffee urns, a hot milk urn and steam tables and cabinets. It takes nine men to operate each service counter. The dishes are washed by machinery and sterilized with clean boiling water. A 30-ton ice-making machine is installed and ice boxes abound in all departments. One such box is utilized solely to freeze garbage until it can be removed.

One whole room is given over to the manufacture

of ice cream, which has a steady sale. A butter cutter soon reduces a tub of butter to small pieces, and potatoes are pared by a rotating emery wheel in a machine that takes the skins from a bushel of potatoes in about seven minutes. Even the bread is cut by machinery.

The kitchen has a large size hotel gas range, all-steel tables, steam cook pots and large vegetable steamers, and many pieces of machinery, such as electric food choppers and other apparatus familiar only to those whose business takes them into large kitchens. The butchers have a room of their own equipped with two large refrigerators. The bake shop resembles the kitchen in its interesting and little-known equipment. One discovers, for instance, that rolls get their rich brown crusts by tarrying awhile in a steam box before going into the ovens. The gas ovens themselves are interesting, as they are of the reel type and the food rests on shelves which slowly revolve within a large cylindrical shell. Forty-eight 4½-lb. loaves of bread or fifty-six pies can be baked at one time in each oven.

As only a small portion of any one shift can be provided for in the cafeteria, it is necessary to establish temporary cafeterias in various units at each lunch period. This problem found its solution in the "buffetmobile" developed by the company operating the lunch service. The illustrations show the general idea of this rather remarkable device. One man can push it to its appointed place while another pushes a trailer containing the 400 sets of platters, dishes and cutlery. When the "buffetmobile" is in position, an attendant plugs into an electric socket and at once the electric hot plates and coffee urn are at work renewing the small amount of heat lost in transit. It has large storage shelves and cabinets for food that does not require to be kept warm. It is an ingenious and compact apparatus for serving hot meals at a point far distant from the kitchen. Ultimately many "buffetmobiles" will be in use.

For the executives there is a finely decorated Old English grill room which seats about forty at one time. This has an electric grill and a refrigerator show case, a compact but complete equipment for serving special dishes or a complete dinner promptly.

The Remington company entered early upon the



The Remington plant is guarded in side and out. Passes are usually issued so that a visitor can only enter specified portions of the plant. If a pass is lost, the visitor is taken to the guard house and detained until he is vouched for and a duplicate pass issued. Guards are chosen from men who have served in the army, navy or marine corps.



task of making its employees comfortable and contented and of building up a good shop spirit. To guide and direct this work it has borrowed a man from the industrial department of the Young Men's Christian Association. This man, J. A. Page, came to Bridgeport direct from the Canal Zone, where for three years he had been in charge of the Government club-house at Cristobal. Previously, in 1908, he had organized the first miners' Y. M. C. A. work at Charleston, W. Va.

#### THE ACTIVITIES OF THE INDUSTRIAL SECRETARY

The industrial secretary touches all the activities of the plant somewhere among his numerous duties. If there is trouble with the street car service, his is the task of taking up the matter with the proper officials. The workman upon whom circumstances have thrown a burden of debt, finds in his advice or through his influence a way out. He helps many a man to find a home or shelter in the greatly overcrowded city of Bridgeport, working in close co-operation in such cases with the head of the company's real estate department. The present building operations of the real estate department will house 746 families, and this and other agencies promise to relieve the pressure for homes—a pressure for which all the other thriving industries of this rapidly-growing community are in part responsible. If a man feels that he has a just grievance concerning his work or treatment, he is made to understand that the industrial secretary is a powerful influence toward setting wrong matters right.

Under Mr. Page's guidance there has been formed the Remington Mutual Benefit Association, which has 900 members now and inside of six months will have 2000. "A mutual benefit association," to quote Mr. Page, "stops the nagging of the men by the unceasing circulation of begging papers and provides a blanket for men of improvident habits." There is much interest in a foremen's club, which has over 100 members now and will have double that number shortly. It has one noon meeting each month for shop talks and one evening meeting, usually at some hotel or club, which is more social in

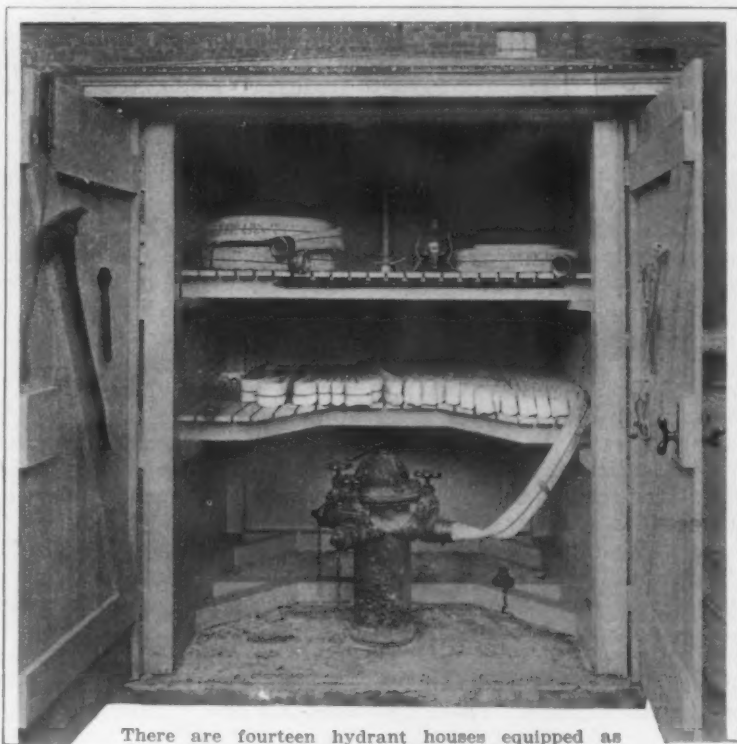
character. It has already become a strong factor in the plant's efficiency.

Athletics have been a successful venture. The Remington baseball team had a most successful season and the football team was scored on but once last fall. There is a bowling league of twenty-four teams, an eight-team basketball league and an eight-

team rifle tournament is in progress. Four tennis courts were built this past season. One big shop outing was held last year, and similar events are being planned for this year. A minstrel show was given Jan. 21 and 22 by shop talent, and a choral club is planning an even more ambitious event. The club-house idea is lurking in the background of all these activities, and when the pressure of organization relaxes a little, it will probably find reality in some substantial form.

On the top floor of one of the middle service buildings is located the plant hospital. One room is used as an office and record room. Here are kept the records and history cards of all the cases treated—no small task in a plant of this size. The middle room is the emergency room. It is notably complete in its equipment and has facilities for surgical work of all kinds—even major operations, if necessary. All about is porcelain and nicked apparatus—mostly sterilizing apparatus of high and low pressure, of moist or dry heat, or cabinets for sterile goods. Then there is the awesome instrument cabinet—only this one is a little more menacing than one usually sees because of its size and the multiplicity of instruments. In the third room are three beds, where patients can be cared for while waiting the coming of the general hospital ambulance.

In the scope of the work the Remington hospital differs but little from other good industrial hospitals. A man who receives an injury, however slight, must come to the hospital for treatment, and workmen who are attacked with illness are urged to do so. Accident cases, when severe enough to confine a man to the hospital or his home, are followed up by the company's doctor. Medical cases are treated only at the hospital. Foremen give workmen passes to go to the hospital, and the surgeon



There are fourteen hydrant houses equipped as shown in this view and four larger hydrant houses which contain two-wheel hose reels



Wherever oil is stored or largely used, one of these sawdust boxes is placed. The sawdust is impregnated with 10 per cent of bicarbonate of soda and is spread over the burning oil. The shovel rests against a large drop door at the bottom of the container.

or nurse in charge provides them with a treatment pass, if other visits are necessary. These passes have on them the time, the date, employee's name and check number and the department. First-aid instruction is being given to foremen and other selected men in each department. In the service unit housing the hospital, a special button on each floor rings an emergency bell to summon the elevator man. These buttons are mounted in the center of large green crosses, labeled "Emergency Hospital."

The hospital is in charge of Dr. W. J. Colgan, a Bridgeport surgeon, who has directed its growth and equipment since the time it occupied a little room in the corner of one of the first forge shops in the days when the plant first began to assume form. The hospital staff of nurses and male attendants is growing in pace with the increase in the plant working force.

An engineer, who comes directly under the equipment engineer, is delegated to give his whole time to the inspection of danger points and to the planning and installation of mechanical safeguards and protection devices. Half of one floor in a machine unit of the main building is devoted to building models for protection devices, which, when perfected, are made in quantities by outside contractors. More than 30,000 protection devices are already planned for, and are being installed as fast as the machinery is set up. Every effort is being made to make machinery fool-proof by mechanical means, and parts of certain machines have been redesigned and altered in the carrying out of this ideal. Punch presses, for instance, that could be operated with one hand have been changed so that both hands must now be employed to start the press. Safety talks form a considerable portion of the discussions at the meetings of the foremen's clubs, and the thought of "safety first" is kept before employees by the liberal use of bulletin boards whereon are displayed the strikingly illustrated literature now being issued by the national safety organization. The company furnishes goggles for all employees exposed to eye injuries and is insisting on their use. The shop rules on safety are formulated along the lines now recognized as a necessity in industry, and the violation of rules is followed by severe punishment or instant dismissal.

The plant is equipped through-

out with sprinklers. There are two 100,000-gal sprinkler tanks erected near the power plant. In the power plant are installed two 1000-gal. two-stage centrifugal steam-turbine direct-connected pumps. There is also a connection with the city water supply. Scattered about the grounds are eighteen three-way hydrants. Over fourteen of these are erected shelters containing 150 ft. of 2½-in. hose and the usual appliances demanded by underwriters' requirements. Over four of the hydrants are housed two-wheeled hose reels carrying 500 ft. of hose. A similar reel is located at fire headquarters, opposite the main building. Hung under shelter in the side of each of the seven transformer houses is a 35-ft. extension ladder.

There are seven two-wheel 45-gal. American-La France chemical engines. Five of these are

located in a central service building, one on each floor, one at fire headquarters, and one in the dry-kiln building. On each floor of the machine units are two 3-gal. chemical extinguishers and two sections of 1½-in. linen hose—75 ft. each—on wall reels and connected with the water mains. There is a fire bucket in a bracket on alternate posts on each floor, making eight to a floor. Each floor in a service building has one chemical extinguisher, 50 ft. of linen hose and two fire buckets. At all motors, transformers and switchboards there are Pyrene or Justrite chemical extinguishers. Wherever oil is stored or largely used, there are containers filled with sawdust and soda. These have large doors at the bottom and a snow shovel, painted red to be conspicuous, is used to cover oil fires with the sawdust blanket. This method of fighting oil fires was introduced by Fire Chief John H. Farmer, who came to his present position after serving in a similar capacity for seventeen years with the Stanley Works, New Britain, Conn.

A fire alarm system with sixty-five stations is installed. The plant is districted and different toned gongs designate the district even before the number is completed. The box number is also registered on a tape. The alarm is sounded in fire headquarters, the power house and the guard barracks. A big whistle calls the fire companies. A second alarm on the plant system brings out the city department.

A fire company is organized from the employees of each shift. With the day shift, two assistant



It takes 400 pies, 35 sandwich buns and 20 things turned out in the picture how busy a place this will be when the shops are fully manned. The bread mixer in the foreground and the reel ovens at the right are motor driven. 4½-lb. loaves of bread, 70 doz. doz. crullers (to mention a few of the bakeshop) to feed 1600 people, so it

SPECIAL	MENU
CLAM CHOWDER 5¢	STEWED PRUNES 5¢
BAKED FISH & POTATO 10¢	ASST. CAKES 5¢
POT. ROAST & POTATO 10¢	FRIED EGG SANDWICH 5¢
BAKED BEANS PER POT 5¢	FISH PER CUT 5¢
MACARONI 5¢	CEREAL & MILK 5¢
BREAD PUDDING 5¢	BREAD AND BUTTER 5¢
RICE PUDDING 5¢	CRULLERS 2 FOR 5¢
HAM SAND 5¢	BAKED APPLE 5¢
CHEESE SAND 5¢	PUDDING 5¢
APPLE PIE 5¢	MILK OR COFFEE 5¢
PEACH PIE 5¢	ICE CREAM 5¢
PINEAPPLE PIE 5¢	SOFT DRINKS 5¢

As the Remington Company assumed the cost of equipping the cafeteria, the company operating it is enabled to serve large portions of high-quality food at low prices





The cafeteria seats 620 at one time and a broad shelf along three sides of the room will accommodate 200 more, standing. The tables have opaque glass tops and the bent wood chairs are unusually sturdy. There are two service counters, one at each side of the far end of the room.

chiefs are on duty who devote their time to the work of inspection and fire prevention. This is carried out with great thoroughness. The evening and morning shifts are each in charge of an assistant chief who has under him an inspector.

In each shift there are five hose companies of eight men each and one ladder company of ten men. The hose companies are organized with a captain, lieutenant, hydrant man and five nozzle men. Practice is held once a week in summer and every two weeks in winter. The entire department does not respond to a first alarm. A reserve which is quite essential in a plant so extensive is thereby maintained for exigencies.

The factory cleaning system requires a large crew of men. On each floor of every unit one man

is constantly busy picking up waste, sweeping up refuse and gathering the metal chips from the machines. Each class of refuse has its own receptacle and gangs are busy with electric trucks carrying away the refuse cans to be emptied. Dirty waste is reclaimed and garbage is now burned in an incinerator but later will be burned under a low pressure boiler.

The fire escapes are an interesting development of the detached, fireproof well idea. One is located at each end of each of the machine units of the main building, forming a corner of the structure. Entrance is gained by passing from each workroom to a concrete balcony through doors equipped with "panic proof" locks which open at the slightest pressure against a transverse rod placed breast



The Buffetmobile is set up at its station ready for business. The food is kept hot by electricity, plugs being provided at each station so that a connection with the current mains is quickly made. The coffee is heated by resistance coils in the bottom of the urn.



high on the doors. These balconies are shown on each story of the buildings in the illustrations of the plant. Passing a step to the left on the balcony, one enters the fire-proof well which has no doors. Flames could be pouring from every window without in any way blocking the balconies or stair well, a point of much superiority over the ordinary outside fire escapes.

#### THE SCIENTIFIC LABORATORIES

The Remington company is going far in its equipment of men and apparatus in the physical and chemical laboratories. To direct this work, it has secured William Crosby Marshall, formerly professor of machine design at Sheffield Scientific School, Yale University. In the physical laboratory there are two Riehle testing machines, one of 100,000 lb. and one of 50,000 lb. and an unusually complete assortment of apparatus, furnaces, etc., for the determination of the physical characteristics of steel and other metals. Certain other testing equipment is now ordered which will give the physical laboratory unusual facilities.



Besides the emergency room of the shop hospital, there is a room, shown in the background of the right-hand view, with three beds, for those seriously injured or so ill that removal by ambulance to a general hospital is necessary. Records are kept in the surgeon's office, which plays an important part in these days of workmen's compensation laws.

ties, and make it unique among industrial laboratories. The chemical laboratory is adequately equipped for analysis of all the raw material used in the plant and checks all such material against established standards. The metallographic division will be a great factor in maintaining or raising the standards of Remington products as special attention is being given to this important work. For making photomicrographs the apparatus and facilities are of the best. The equipment in all divisions shows that nothing has been neglected or overlooked that will serve to make these a notable addition to the growing list of American industrial testing and research laboratories.

The Meily furnace, Lebanon, Pa., which has long been idle, is being prepared for operation by George E. Meily. The Rust Engineering Company, Pittsburgh, is repairing the plant.

## PRODUCTION OF EXPLOSIVES

### Government Census Figures for 1914 and Those for 1909

WASHINGTON, D. C., Feb. 1, 1916.—The total value of explosives produced in the United States in 1914 was \$41,453,339, as compared with \$40,139,661 in 1909, an increase of 3.3 per cent, according to the official figures of the quinquennial census of 1914, which has just been completed for this industry. From a statistical standpoint the 1914 returns will be of value in affording a basis upon which to calculate the abnormal increase during 1915, the determination of which is now being attempted by one if not two governmental bureaus in connection with pending proposals to tax war materials.

Reports were received from 111 establishments engaged in the manufacture of explosives in 1914, as compared with 86 in 1909. The increase in the number is due largely to the fact that existing companies have built a number of new plants at various points selected especially with reference to the shipping facilities available.

These 111 establish-

ments reporting in 1914 used as materials 15,832 tons of sulphur, or brimstone, 25,885 tons of pyrites, 190,960 tons of nitrate of soda, 29,002,008 lb. of glycerin and 447,437,676 lb. of acids—sulphuric, nitric, and mixed—including 295,437,398 lb. produced and consumed in the same establishments. The manufacturers also reported the production and consumption of 61,280,242 lb. of nitroglycerin, 3,616,895 lb. of cellulose nitrates, and 29,891,837 lb. of nitrate of ammonia and other materials.

The decrease in amount of explosives manufactured in 1914 as compared with those produced in 1909, is due to the decreased production of nitroglycerin, which is used largely for torpedoing oil wells.

The "permissible" explosives are those for use in mines, which conform to the regulations of the United States Bureau of Mines in not igniting inflammable gases or evolving permanent poisonous gases.

While the production of gunpowder decreased by 5,177,664 lb. in quantity and \$758,972 in value the production of smokeless powder almost doubled, but the figures for it can not be shown separately without dis-

closing the operations of individual establishments. The output of this product, therefore, is combined with that of guncotton, or pyroxylin, and the total included in "other explosives." The production of smokeless powder, guncotton or pyroxylin, and "other explosives" increased from 9,155,223 lb. to 26,400,071 lb., or by 188.4 per cent. This amount includes the production of establishments operated by the Federal Government. The output of this class of explosives by commercial establishments is given in the accompanying table of comparative statistics for quantity and value of products:

Manufacture of Explosives in 1914 and 1909			Per Cent of Increase*
	1914	1909	1909-1914
Total, all products .....	\$41,453,339	\$40,139,661	3.3
Total explosives:			
Pounds .....	482,003,100	487,481,252	-1.1
Value .....	\$39,656,310	\$37,983,868	4.4
Dynamite:			
Pounds .....	223,000,073	195,155,851	14.3
Value .....	\$20,560,501	\$18,699,746	10.0
Permissible explosives:			
Pounds .....	18,112,601	9,607,448	88.5
Value .....	\$1,604,072	\$863,209	85.8
Nitroglycerin:			
Pounds .....	3,560,581	28,913,253	-87.7
Value .....	\$866,120	\$3,162,434	-72.6
Blasting powder:			
Pounds .....	208,316,125	232,477,175	-10.8
Value .....	\$8,536,756	\$9,608,265	-11.2
Gunpowder:			
Pounds .....	7,685,036	12,862,700	-40.2
Value .....	\$977,455	\$1,736,427	-43.7
Other explosives (including smokeless powder and guncotton or pyroxylin sold as such):			
Pounds .....	21,327,684	7,464,825	185.7
Value .....	\$7,111,406	\$3,913,787	81.7
All other products .....	\$1,797,029	\$2,155,793	-16.6

\*A minus sign (—) denotes decrease.

#### LOCATION OF ESTABLISHMENTS

Of the 111 establishments in operation in 1914, 33 were in Pennsylvania, 11 in Ohio, 9 in Illinois, 8 in New Jersey, 7 in West Virginia, 6 in Oklahoma, 5 in California, 4 in Missouri, 3 in Kansas, 3 in New York, 2 each in Alabama, Colorado, Indiana, Massachusetts, Tennessee, Washington and Wisconsin, and 1 each in Arkansas, Delaware, Iowa, Kentucky, Maine, Michigan, Minnesota and Texas.

W. L. C.

The Erie City Iron Works, Erie, Pa., has placed an order for a 15-ton electric traveling crane with a 71-ft. span with the Cleveland office of the Niles-Bement-Pond Company.

## A Hack Saw Machine with New Features

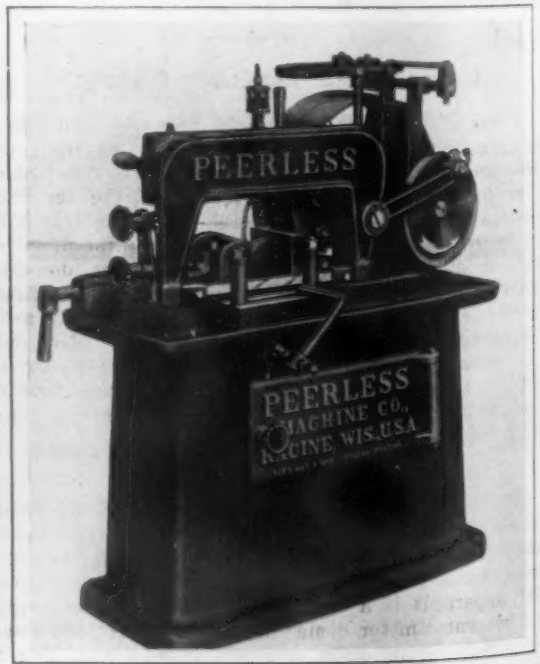
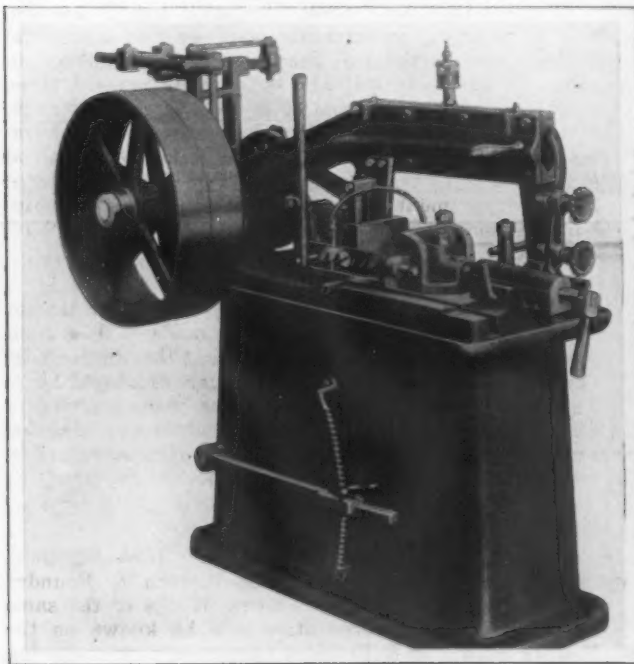
The Peerless Machine Company, Racine, Wis., has placed on the market an improved style of hack saw machine. Among the features embodied in this new machine are an automatic feed and saw lift, a vise equipped with a quick-acting device and special arrangements for cutting short pieces and clamping irregular sections and a special type of holder and tightener for the saw blades. While the construction of the machine is heavy the machine is offered for sensitive work.

The base of the machine is of the full cabinet type which, it is emphasized, eliminates the chance of springing the working parts of the machine when heavy work is being cut, or vibration occurring when operating at high speed. The bottom of the cabinet forms the cutting compound tank, with the circulating pump in the interior of the cabinet at the back, out of the way of injury.

The saw table is provided with T-slots on each side of the vise for clamping work of irregular section that cannot be readily held in the vise. The vise is of the quick-acting type, with an attachment for short pieces. A screw adjustment of 1 in. is provided to put the finishing touches on the clamping of the stock.

The saw frame travels in a V-shaped slide and the bearing on it is 11½ in. in length, which is relied upon to insure a long lift. It is pointed out that only one adjustment is necessary for taking up wear, this being the upper slide. The saw blade travels in the center line of the guide and the connecting rod, an arrangement designed to eliminate any chance for side pull.

The feeding mechanism has a spring to give the same effect as if a weight was used. The uniform pressure is controlled by the lever passing over the notched segment on the base shown in the left portion of the accompanying illustration. The pressure depends upon the position of the lever between the bottom and the top notches. The belt shifting lever controls this mechanism, the machine commencing to operate as soon as the belt starts to shift. The feed mechanism, however, does not come into action until the belt has been shifted three-quarters of the distance between the loose and tight



A High-Speed Power Hack Saw Machine Which Has an Attachment to Keep the Vise Jaws from Tilting when Short Pieces Are Being Cut, a Quick-Acting Screw Adjustment for the Vise and T-Slots on Each Side of the Machine for Clamping Irregular Pieces

pulleys, this arrangement being relied upon to allow the cutting compound to be supplied to the blade and work before the feed is engaged. Another advantage of this arrangement is that the operator can apply a little pressure on the blade by pressing down on the handle shown on the saw guide until the machine has made a few strokes, this feature being particularly useful in starting a square corner with a coarse toothed blade and a heavy feed pressure. If desired the feed can be entirely released by placing the lever at the lowest point of the notched segment and by gradually raising it, applying a continually increasing pressure to the blade. The sensitiveness of the feed is indicated by the fact that if desired the blade can be made to just scratch the work.

A spring is also employed for the automatic lifting mechanism, the saw frame being overbalanced by this spring. A cam on the main shaft is relied upon to permit the feeding spring to act only on the cutting stroke, and when this is completed the cam automatically disengages the feed, the saw frame rising and bringing the blade clear of the cut due to this overbalancing action until the end of the return stroke. At this time the feeding spring is again brought into action, the process being repeated until the cut is entirely completed, when the power is automatically shut off. The control of the feeding mechanism by the belt shifting lever, it is pointed out, causes the feed to be released before the machine stops and the saw frame rises automatically.

A length gage is provided for the saw frame for use where a considerable amount of stock of the same size is being cut. A depth gage stops the machine automatically at any desired depth of cut and raises the frame clear of the work. This arrangement serves to save time and to relieve the operator of the necessity of lifting the saw frame after each cut.

In tests made of this machine a 3-in. bar has been cut off in less than 2 min. with an operating speed of 250 r.p.m. and a 1-in. round cold rolled steel bar has been cut in less than 1 min. at a speed of 125 r.p.m. with an ordinary hand hack saw blade. Another test that has been made is cutting a piece off the end of a 1/16-in. steel sheet set edgewise in the vise.

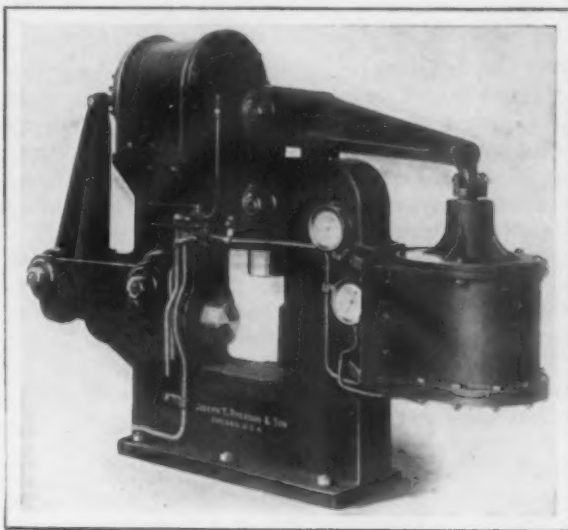
### German Sheet Syndicate Planned

A Berlin publication recently received states that the German manufacturers of sheets are planning the formation of a syndicate. The reference to this matter is as follows: "A further evidence of the tendency toward combining for the general good is indicated by the desire on the part of German manufacturers of black sheets to form a syndicate for the domestic market along the same lines as the existing syndicate for the foreign market. The primary object is price regulation according to approved methods." Not only does Germany have no Sherman anti-trust law, but by way of strong contrast to conditions in this country the utmost freedom is allowed manufacturers to regulate prices and output.

The Harrison Safety Boiler Works, North Philadelphia Station, Philadelphia, Pa., received a gold medal award for its exhibit at the Panama-Pacific International Exhibition of the Cochrane metering heater. This apparatus is a combined open feed water heater and hot water meter designed to heat boiler feed water by exhaust steam from engines, pumps, etc., and to meter the water, simultaneously recording the rate of flow and integrating the total flow in any elapsed period.

### Pneumatic Press for Banding Springs

A spring banding press designed for use in railroad and commercial spring manufacturing and repair shops that are not equipped with hydraulic power, has been brought out by Joseph T. Ryerson & Son, Sixteenth and Rockwell Streets, Chicago, Ill. It will handle all



A Pneumatic Banding Press for Railroad and Commercial Spring Manufacturing and Repair Shops Capable of Exerting a Pressure of 60 Tons

of the ordinary spring banding operations and can be operated from the regular shop compressed air line. Air at a pressure of 100 lb. is required to operate the machine.

Both horizontal and vertical rams are employed, the cylinders connected with them being of such a size, 16 in. in diameter, that any of the ordinary pressures up to a maximum of 60 tons it is explained can be exerted on the spring band, this, it is emphasized, insuring uniform and rapid work as compared with hand banding of the springs. The rams are operated by three-way, hand-controlled valves, which are included with the equipment regularly furnished, together with the necessary pressure gages. The weight of the machine is approximately 6500 lb.

### A San Francisco Structural Mill

The Pacific Coast Steel Company, San Francisco, Cal., is starting construction work on two additional 50-ton open-hearth steel furnaces, to be completed in about 90 days. It will also enlarge its present three open-hearth furnaces from 30 to 50 tons capacity each. In the rolling department it will install a 36-in. blooming mill, for the purpose of enabling it to roll structural shapes up to 15 in. The reason given for the increase in this department is the demand for shapes for ship-building, some important business of this character having already been booked by the company.

Reference to the manufacture of the Heider tractor by the Rock Island Plow Company, made in THE IRON AGE of Jan. 27, should have stated that the Heider Mfg. Company, Carroll, Iowa, which has manufactured hardware and agricultural specialties for many years, will continue the development of those lines and was led in part to dispose of its interest in the manufacture of tractors in order to provide more room in its plant for the expansion of its other operations.

The Newark Stamping Company, Newark, Ohio, merged Feb. 1 with the Moser Pattern & Foundry Company and the Huffman Plating Works of the same city, and the new corporation will be known as the Newark Stamping & Foundry Company, manufacturing automobile accessories, castings and Thompson patent hose clamps, as well as doing pattern work of all kinds, plating and metal spinning.



# Determination of Grain Size in Metals\*

A New and Rapid Method with Rules  
and the Apparatus Necessary—The  
Value and Importance of Such Data

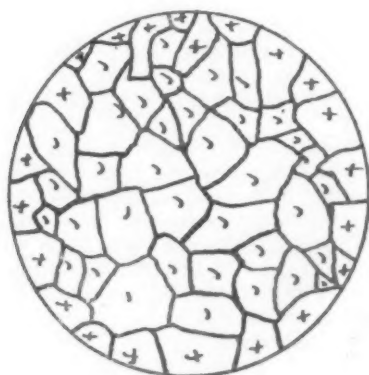
BY ZAY JEFFRIES, A. H. KLINE AND E. B. ZIMMER

It is well known that many properties of a given metal vary with the size of grain or cell. For most industrial purposes, where high ultimate strength and high elastic limit are desired, the manufacturer tries to produce a fine-grained structure. For some purposes, for example in transformer iron, a coarse-grained structure is desirable.

The terms fine-grained and coarse-grained are used only in a relative sense. For example, a fine-grained cast copper might have grains 100 times larger than coarse-grained high-speed steel. Similarly, a fine-grained steel rail might have grains or cells 100 times larger than coarse-grained wire, which was made of steel from the same heat.

## VALUE OF GRAIN-SIZE DETERMINATIONS

In some metals, the change in grain size is more appreciable than the changes in any of the properties determined by the tensile test. Furthermore,



The Authors' Method of Estimating Grain Size of Metals

in metals which have been annealed or subjected to high temperatures, grain size may prove to be a better indication of the life of the metal in use than the tensile test. One of the authors was able to supplant the tensile test with grain-sized determinations in the control of metal for a specific use, the latter determination being more indicative of the life of the metal part than the tensile test. A grain-size determination with a tensile test is, of course, more valuable than either singly.

At present there is a decided dearth of data on actual grain-size determinations in metals, and consequently a corresponding lack of ability to interpret the determinations after they are made. It would be desirable to have correlation made between grain size and properties of metals, comparing thousands of determinations. In this way, grain-size determinations might be interpreted in much the same manner that a tensile test is now.

One of the chief reasons that more grain-size measurements have not been made is the excessive work involved in making a determination. The planimeter method is accurate—in fact, too accurate for the nature of the work involved—but it is

slow and tedious. It involves the tracing of the outside boundary lines of a group of grains, counting the grains, measuring the area with a planimeter, and a calculation which is different for each determination. Furthermore, the method requires a planimeter, which piece of apparatus might not be available in all metallographic laboratories.

We have developed a method by means of which a grain-size determination can be made in one-fifth the time required by the planimeter method. The method is as accurate as the sampling of the specimen and requires no apparatus which is not available in metallographic laboratories.

[After discussing rather fully the methods known as the planimeter, the intercept and Heyn's, the authors present their own.]

## THE AUTHORS' METHOD

Our method has for its object the quick determination of the equivalent number of whole grains included within a circular portion of an image. It is evident that some of the grains will be completely included within and some will be intersected by the circumference of the circle. The former will have no correction factor. The boundary grains, however, will be partly inside and partly outside the circle. In the illustration the grains marked with a check mark are completely inclosed and those marked + are the boundary grains. The average portion of each boundary grain included within the circle may be found as follows:

The grains completely included within the circle are first counted and checked. Then, the boundary grains are checked with a different mark and counted. (If the counting is done at the time of checking, the time of making a determination will be shortened.) In the illustration there are 37 included grains and 22 boundary grains. The area of the included grains by planimeter

Table Showing Results of Grain Size Determinations by the New Method

Grains Completely Included	Average Value of $y$	Number of Determinations
10-20	0.556	11
20-30	0.582	15
30-40	0.542	13
40-50	0.574	10
50-60	0.59	11
60-70	0.60	12
70-80	0.576	11
80-90	0.577	10
90-100	0.596	10
100-120	0.551	11
120-140	0.618	11
140-160	0.546	10
160-180	0.566	10
180-200	0.558	11
200-230	0.606	10
230-290	0.622	9

is 1.9 sq. in. The area of the circle (diameter 1.83 in.) is 2.635 sq. in.

$$1.9 : 2.635 = 37 : X$$

$X = 51.3$  the equivalent number of whole grains within the circle.

$51.3 - 37 = 14.3$  the equivalent number of whole grains in the inside portions of the 22 boundary grains.  $\frac{14.3}{22} = 0.65$  average portion of each boundary grain within the circle.

If this factor be determined on a large number of samples, it may be used on unknown samples to find

\*A contribution from the metallurgical laboratory of Case School of Applied Science, Cleveland, Ohio, to the February meeting in New York of the American Institute of Mining Engineers. Mr. Jeffries is instructor in metallurgy at Case School.

the equivalent number of whole grains within a circular area. If we call this factor  $y$ , the total number of grains within a circle is,

$$z + yw,$$

where  $z$  is the number of grains completely inclosed and  $w$ , the number of boundary grains.

The factor  $y$  has been determined empirically on 175 samples. The results are given in the table. The first column represents the number of grains completely included within the circle.

The average value of the factor  $y$  for 175 determinations is 0.581. The same factor can be used for all numbers of grains included within the observed area, but it is recommended that all important determinations have at least 50 grains included within the circle. Since 0.581 is nearer to 0.6 than to 0.5 we have adopted 0.6 as a general factor for all determinations. It should be noted that an error of 1 per cent in the determination of the whole grain equivalent of the boundary grains makes an error of less than 0.25 per cent in the final result, since more than 75 per cent of the total area of the circle is occupied by the included grains.

The following is an example of how the factor is used:

Inclosed grains	=	66.0
Boundary grains	=	28.0
Factor	=	0.6
$66 + 0.6 \times 28 = 82.8$ grains within the circle.		

From the magnification, the number of grains per unit of area can be readily calculated.

#### COMPARATIVE ACCURACY OF METHODS

Our results show that the intercept method and Heyn's method are not accurate. The largest error found in 187 determinations by our method was 6.4 per cent, the average error 2.1 per cent, and the average algebraic deviation from the planimeter measurements, plus 0.25 per cent.

An average of 30 representative determinations showed that 78.5 per cent of the total area of the circle was occupied by the included grains. This portion is determined accurately by our method. The factor is used in determining only 21.5 per cent of the number of grains. An error of 5 per cent in estimating the boundary-grain portion makes an error of slightly over 1 per cent in the final result.

A square or any other shape might be used instead of a circle. It seems probable, if a square or rectangle were used, that the factor would be 0.5 instead of 0.6, when the circle is used.

#### SUGGESTED RULES FOR SAMPLING

Some metallographic specimens have more than 5,000,000 grains exposed on one face. It becomes necessary to obtain a representative sample of this face. We have tentatively adopted these general rules which, of course, can be changed as occasion demands.

1. Use such a magnification that about 50 grains will be included within the circle. (It is better to have more than 50 grains included within the circle than less, but it is always recommended that an even number of magnifications be used even though the number of included grains should exceed 100.)

2. Make at least five determinations at about equal intervals along the diameter of the specimen. The average of all of the determinations is taken as the final result. It is evident that if there is much difference in grain size between the edge and center of the specimen, the former should have the greater weight. Such a case, however, may come under rule 4.

3. If the samples are small enough (for example, small wire), it is advisable to determine the total number of grains on transverse sections, and the total number for a given length on longitudinal sections. It is sometimes practical to do this with larger coarse-grained specimens, either macroscopically or at low magnifications.

4. When one part of a specimen differs greatly

from another part in grain size, do not average the separate determinations, but record each and note the position of each determination by means of a free-hand sketch.

5. In samples which have been cold worked, the relative degree of cold work in any direction is expressed by the ratio of the length divided by the width of the grains. For obtaining this ratio, it is recommended that Heyn's method be used.

#### APPARATUS AND MANIPULATION NECESSARY

Any good metallurgical microscope with camera attachment can be used for grain-size determinations. It is recommended that only even magnifications be used. For instance, if an observation is being made at a magnification of 469 diameters, the setting should be changed to 500 diameters.

Grain-size measurements can be made on a screen or on a photograph. Either a piece of paper fastened to a clear glass or ground glass may be used as a screen. A convenient system, where records of the determinations are kept, is to cut several pieces of thin typewriter paper so that they fit the clear-glass screen, and draw circles with the desired diameter (we use 79.8 mm.) near the center of each sheet. Fasten one of these pieces of paper to the clear-glass screen by means of gummed labels, or otherwise, and project on to it the image of the specimen.

The circumference of the circle should be well within the image. Count and check separately the boundary grains and the included grains, make calculation for grains per unit area and save the sheet of paper with check marks and calculations. This will serve as a permanent record of the determination.

If the existence of a grain boundary is doubtful, often a slight change of focus will remove the doubt. It is, therefore, essential that the fine focusing screw be provided with an extension so the focus can be changed while the operator examines the image on the screen. Unless the room is rather dark, or the microscope lamp excessively strong, the operator will find it helpful to work under a cloth hood. The specimen should be etched so as to bring out distinctly the grain or cell boundaries.

#### A Symposium on Electrochemical War Supplies

The New York section of the American Electrochemical Society has arranged a symposium on "Electrochemical War Supplies" which it will hold jointly with the New York section of the American Chemical Society and the Society of Chemical Industry at the Chemist Club, 52 East Forty-first Street, New York, Friday evening, Feb. 11. The program will include "Electrochemical War Supplies" by Lawrence Addicks, "Air Saltpetre" by W. S. Landis, "Hydrogen for Military Purposes" by E. D. Ardery of the U. S. Navy, "New War Products" by Albert H. Hooker, "Magnesium" by William H. Grosvenor, "Liquid Chlorine" by G. Ornstein and "Electric Steel" by George W. Sargent.

An extensive aluminum smelter is being organized at Höyanfjord, Norway, where there is a waterfall which may furnish 60,000 hp. It is proposed to develop 20,000 hp. at once so as to produce 4000 tons of aluminum per year. A number of beauzite beds have been secured in southern France, where the ore will be concentrated into oxides and shipped to Norway for conversion into metal by electric furnaces.

John W. Reilly, Fort Hunter P. O., Pa., has obtained sufficient orders to warrant resumption of his charcoal forges at Lucknow, Pa. The fires will be lighted as soon as the machinery, which has been idle for three years, can be repaired.



## ELECTRO-HYDRAULIC SHOVEL\*

One-Man Machine Developed for Stockpile Loading at a Michigan Iron Mine

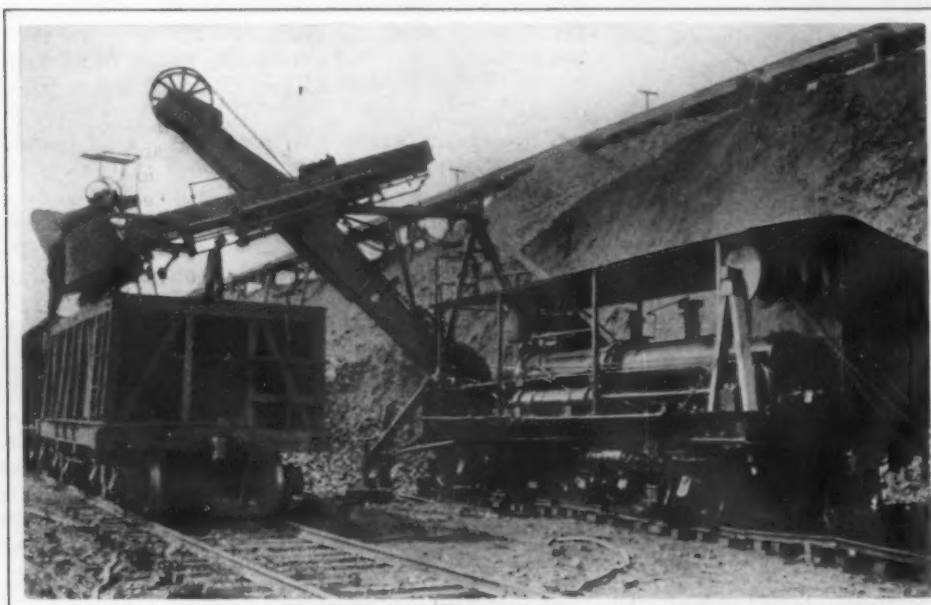
BY FRANK H. ARMSTRONG†

All the mining machinery of Penn Iron Mining Company has been operated by electric power for several years and when another shovel for stockpile loading was required the advantages of an electric shovel were naturally considered. After considerable study, serious objections suggested themselves to a shovel operated directly by electrical apparatus by reason of the complicated control, severe service on the motors and the heavy surges of current required from the line. It was finally decided to construct an electro-hydraulic shovel using water under pressure to perform all the necessary operations except that of propelling, for which a separate motor was best suited. A car body with boom, dipper handle and dipper of late design, but without any of the steam machinery,

end of these ropes is anchored to the front flange of the hoisting cylinder, while the other end is fastened to the dipper. The dipper travels 2 ft. for every foot the plunger travels. The cylinder is single acting, since the weight of the dipper pulls the plunger back when the valve is open to exhaust. The swinging of the boom is effected by a double-acting cylinder with a piston and rod extending through each cylinder head, with a sheave at each end of the rod. The swing circle at the base of the boom is moved by a rope, the middle of which passes around the front end of the swing circle and the ends go around the sheaves on the ends of the rod and fasten to the car body. The thrusting is done by the piston rods of four thrusting cylinders directly connected to the dipper handle. The four cylinders give a perfect balance around the shipper shaft. The piping to the thrusting cylinder is made with swivels and sleeve joints, so that the dipper can be raised or lowered, or the boom swung either way or raised without putting any strain on the piping.

The shovel is operated entirely by one man. His

right hand does all that the crane-man on a steam shovel does. He pushes the operating lever from him to thrust out and pulls it toward him to bring the dipper in. His hand if dropped a trifle strikes a button below the hand and trips the dipper door. His left hand operates the valve for the hoist; forward to hoist, toward him to lower. His feet operate the swing valve by pushing on levers that are interconnected. By pushing on his left foot he swings the boom and dipper to the left; by pushing on his right foot he swings them to the right. When the feet



Power Shovel Operated with a Supply of Water Under Pressure Maintained on the Shovel Car by an Electrically-Driven Pump. The Car Itself Is Propelled Electrically

was purchased. A motor-driven centrifugal pump, a pressure tank, an air tank, a small air compressor and water cylinders with plungers, pistons and valves were installed in place of the steam equipment.

The shipments of ore in the summer of 1914 were so small that the new shovel was not given a thorough test, but in 1915 the shovel requirements were more favorable. It was soon found that the tanks and the air compressor could be dispensed with, since a sufficient capacity could be obtained without the use of compressed air, by reason of the fact that the capacity of a centrifugal pump increases rapidly as the head decreases. The removal of the tanks improved the appearance of the shovel as well as lowered the center of gravity, and the accompanying illustration shows the shovel after the changes had been made.

The dipper is hoisted by a large cylinder and plunger. The double hoisting ropes pass around two sheaves at the outer end of the plunger. One

are even, the valve is in the stop position to which the valve is brought automatically by a centering device. The handle of the controller for the motor which propels the shovel is located at the right of his seat.

Considerable manual effort is avoided by a solenoid tripping device for the door of the dipper. A weight on a long arm is suspended from a horizontal shaft and tends to hang vertically, being parallel to the dipper handle when the dipper is down. A small catch holds the shaft from turning as the dipper is hoisted, and when the dipper handle is horizontal the weight is ready to fall as soon as the catch is tripped. On the same horizontal shaft is a short arm the end of which is connected by a chain to the latch of the dipper door. When the weight falls, the jerk with the leverage which the weight exerts upon the short arm, pulls the chain, and trips the dipper door. The small catch is released by a solenoid operated by the button under the operator's right hand.

The average speed of the machine is between three and four dippers a minute. Repeatedly 3000 tons has been loaded in a 10-hr. day, although the railroad service required shifting every two or three

\*From a paper to be presented at the New York meeting of the American Institute of Mining Engineers, Feb. 14-17, 1916.

†Mechanical engineer, Penn Iron Mining Company, Vulcan, Mich.



cars. Much more could have been loaded if good car service could have been obtained.

This shovel has few moving parts as compared to either a steam shovel or a straight electric shovel. There are no gears, clutches, brakes or drums. The few moving parts, except the motor and pump, move very slowly. The pump gives no trouble since the water is clean and mixed with a lubricant. The leakage is small so that a hydraulic oil that will not freeze can be used in winter. The only noise is the hum of the motor and a slight singing of the water as it rushes through the pipes and valves. The advantages are that it is a one-man shovel and does not require a craneman or a fireman. The current drawn from the line has no high peaks and when the shovel is not in operation the current can be shut off entirely and the pump stopped.

## OXYGEN IN CAST IRON\*

### A Chemical Explanation of How It Increases the Strength

BY W. MCA. JOHNSON

The work of J. E. Johnson, Jr., on the effect of small amounts of oxygen in cast iron in increasing its strength and resistance to shock, is of interest from the technical and scientific standpoints. The following exposition of the theory carries Mr. Johnson's explanation further and, in my opinion, will disclose certain related phenomena and perhaps shed further light on the subject.

Some facts, so novel in character as to excite incredulity, have been accepted finally by many metallurgical authorities. One of these is that oxygen to the amount of 0.060 per cent in cast iron gives it a breaking strength of 3500 lb. per square inch, compared with a breaking strength of 2500 lb. per square inch in cast iron of the same composition with respect to elements other than oxygen, but having only 0.010 per cent oxygen. The "oxygenated" cast iron, even if made in a coke furnace, has properties equivalent to the best charcoal pig iron. Mr. Johnson has also established the fact that the variations in combined carbon cannot account for the results. By microphotographic evidence he has shown that in oxygenated cast iron the graphite particles are dense and spherical, while in well-deoxidized cast iron the graphite particles are flaky and leaf-like. It is just a matter of common sense that iron of the latter structure is much weaker than the former.

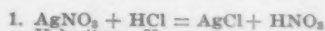
The analytical and microscopical work has been done with care and there is no doubt in my mind about the accuracy of the experimental results. In this paper then, we shall consider it as accepted that small amounts (0.060 per cent) of oxygen increase the strength of cast iron by producing a structure in which the round and solid particles of graphite are surrounded firmly by a principal matrix of ferrite.

The purpose of this paper is to show that the reason why the graphite particles are round is founded on the fact that the particles of any precipitate are made denser and harder by the presence of a reagent having a solvent action on the precipitate. This can be stated as a law, although I have never seen it so given in any textbook.

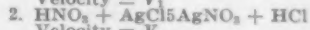
Let us then, for purposes of illustration, give a concrete example and develop the theory of such mechanical and chemical actions as occur: It is well known that, by a soluble sulphate, a barium salt in solution is precipitated in a dense and easily filtered body when the solution is strongly acid with hydrochloric acid, while in a neutral solution barium sulphate is thrown down as a flocculent body. The same is true of silver chloride precipitated out of a silver nitrate solution by hydrochloric acid with nitric acid as the excess reagent. If we increase the proportion of hydrochloric

acid in the case of barium sulphate, and the nitric acid in the case of silver chloride, the precipitate is thereby made dense and easily filtered. In any case, the mechanism of the operation is the same, provided a sufficient interval of time be given to allow the mechanistic operation to proceed to equilibrium.

It may be remembered that this equilibrium is not a static, but rather a kinetic one. By this it is meant that an interchange of molecules from the solid to the solution is continuously taking place. We have the velocities of the two reactions that take place as equal and opposite. We have, as is well known, the two equal and opposite reactions:



$$\text{Velocity} = V_1$$



$$\text{Velocity} = V_2$$

To use an old-fashioned term, the influence of a solvent on a precipitate is as follows: The first form of any precipitate is particles of molecular fineness. If these particles subsequently agglomerate, they agglomerate in long dendritic forms, in accordance with the probable effect of a weak force of cohesion acting on an infinite number of solid particles. In general, the velocity indicated above as  $V_1$  is less than  $V_2$ , and then the precipitate would be dissolved; on the contrary, whenever  $V_1$  is greater than  $V_2$ , precipitation would take place.

Considering now a case when  $V_1$  is greater than  $V_2$ , and precipitation is taking place, and a particle having a body terminating in a point: It is obvious that the instantaneous effect of  $V_1$  would be less on the point of such a particle than it would be about the center, on account of the law of mass action. Therefore, the particle would tend to be dissolved at the point and would then tend to be reprecipitated near the center of cohesive force of each particle. These interchanges would be comparatively rapid at first and then slower, but the general effect would be that the precipitate would become more and more composed of particles of such shape and density that the force of cohesion would act more strongly as the molecules came into closer mutual relation.

The net effect of this would be that the particles of spherical shape would increase in size and density according as the magnitudes  $V_1$  and  $V_2$  were unequal instantaneously, or, explaining it in another way, according to the integrated heterogeneity of  $V_1$  and  $V_2$ .

According to the law of mass action, an excess of  $\text{HNO}_3$  would increase  $V_2$  as compared to  $V_1$ , thus tending to convert the particles of irregular size into the form of a sphere.

Just this action occurs with oxygenated cast iron; we have the solvent action of oxygen on carbon with the production of carbon monoxide which is dissolved in the iron—we may even have the formation of iron carbonyl. We know that when liquid iron cools, graphite forms together with the eutectic. Any excess of oxygen above 0.010 per cent would cause an ebullition of gas, because the solubility point of carbon monoxide in iron would be overreached and there would ensue the steel-making reaction:



It can easily be seen that the percentage of oxygen must be exactly that called for by the physical chemical effect, and it is a great credit to Mr. Johnson that he has learned this by empirical methods. His deduction from *a priori* reasoning, based on premises calculated from many isolated phenomena, is a brilliant intellectual feat, as is his experimental proof.

It may be that further work on the effect of oxygen in cast iron will lead to the conclusion that a certain percentage of oxygen will improve steel. Possibly reagents other than oxygen might be used. As developed in this paper, the application of a chemical theory to the question of the size of particles of the several components of cast iron and steel has attractive possibilities in the domain of both pure and applied science. Unquestionably the presence of the right amount of a solvent will increase the density of a component, provided conditions are such that the law operates within proper limits.

\*A paper to be presented at the February meeting in New York of the American Institute of Mining Engineers.

## AUTOMATIC REVERSING DEVICE

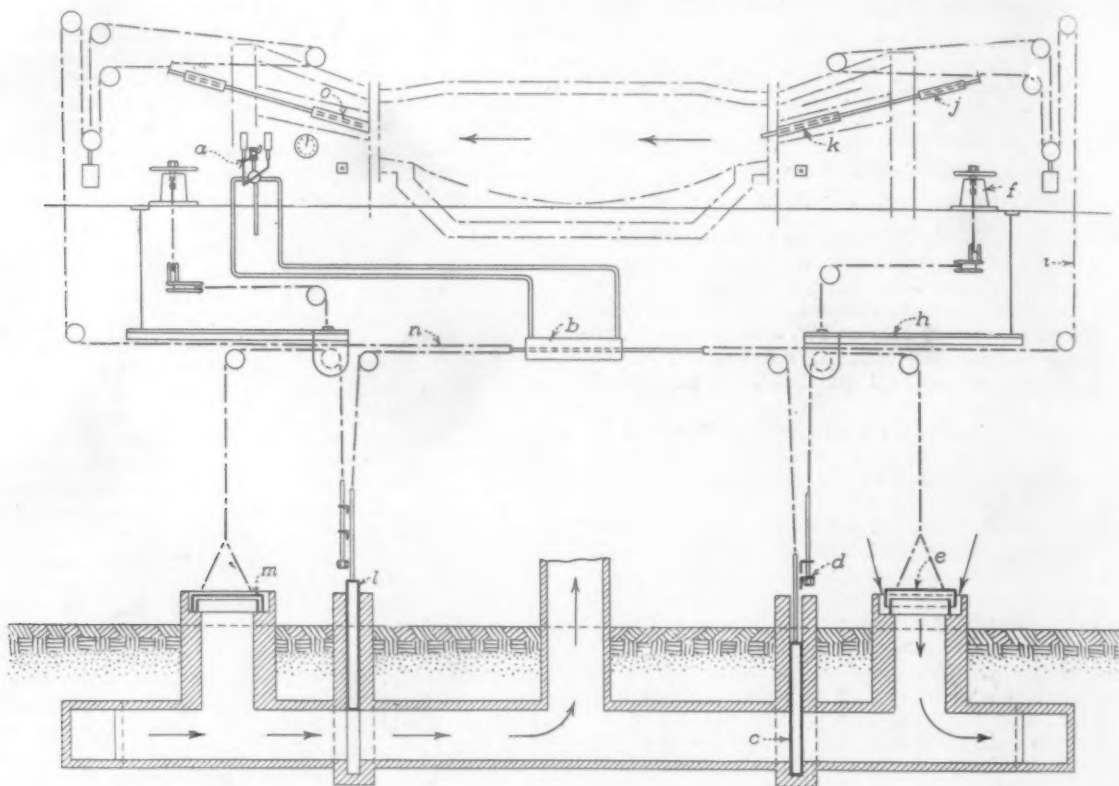
### The Schumann Mechanism as Used on an Open-Hearth Furnace

The Schumann automatic reversing device for open-hearth furnaces has been in successful operation in a large American steel plant on a 50-ton furnace which, it is stated, turns out, because of it, one more heat in 11 hours than any other furnace in the plant. A description of the device is as follows:

On the furnace front a clock is placed on which the minute hand forms a contact and the electric circuit thus closed operates a solenoid which

furnace in less than 20 minutes, the button operating the solenoid is pushed.

When the piston is pulled over it pulls the cable on the left and this raises the water-cooled damper door, *l*, which then lets the stack draft pull on that side of the furnace. When this damper is raised, the clamp attached to it operates, as on the other side, slackening the cable which then lets the damper lid *m* close, shutting off the air from the checkers. When the piston in the cylinder *b* is pushed over it pulls on a cable, *n*, which pulls the burner out of the furnace. When this burner slides out it lies on the cooler *o* which prevents it from being burned by the opposite burner on the other end of the furnace. When the burner starts to slide out



The Schumann Automatic Reversing Device for Open-Hearth Furnaces

in turn raises a plunger at *a* in the illustration. This opens a 4-way valve which admits air, water, or other medium, as the case may be, through the pipe entering the cylinder. The movement of the piston slackens a cable, dropping a water-cooled damper, *c*, and thus shutting off the stack draft. When this damper drops, the clamp *d*, attached to the damper, hits a nut which then pulls another cable raising the damper *e*, letting in air to the checkers and then to the furnace. The damper lid can be adjusted, letting in more or less air. The screw device at *f* tightens or slackens a cable which in turn raises or lowers the beam *h* and this holds the sheave over which the damper lid cable passes.

When the piston in the cylinder *b* is over, it allows a slackening on the cable *i*. When this is slack the burner slides into the furnace and automatically starts operating. There is sufficient slack in this cable so that the counterweight will drop and pull the other cable attached to it which pulls the burner into the furnace. Cylinder *j* will open and let on the steam and oil the very moment the burner starts sliding into the furnace. Cooler *k* will protect the burner when in operation and when not. If for any reason one wishes to reverse the

of the furnace it ceases operating instantly, for the cylinders immediately shut off the oil, steam or air.

When 20 minutes later the furnace is ready to be reversed, the clock hand will touch the next contact point, operating the solenoid which opens the 4-way valve, thus operating the entire mechanism in the opposite manner.

In case one does not want to use the cable device to pull the burners in and out of operation, a small slide valve on the piston rod in the cylinder *b* can be used. The piston rod will operate the slide valve which will let the air, steam or water go to the small cylinders which operate the burners in and out. To cool the furnaces quickly for any reason hang up the two water-cooled dampers which will let the stack pull on the furnaces from both ends.

The device is not experimental and the repairs in operation have been negligible. It provides a constant flame on the bath of metal, one burner going into operation as soon as the other goes out, and it is claimed that the checkers are more evenly heated. Principal patents have been allowed. It is manufactured by the Codd Tank & Specialty Company, Baltimore, Md.



## The Electric Furnace as a Soaking Pit in the Steel Mill

The electrically heated soaking pit for ingots in place of the fuel fired is attracting some interest in the steel industry. The following statement in regard to a special electric furnace for this purpose was made by the inventor, T. F. Baily, president of the Electric Furnace Company, Alliance, Ohio, in a public address not long ago:

The type of electric furnace which seems, however, to be destined to have the largest commercial application in rolling mill operations is the soaking pit, and it is doubtful whether any gas-fired pits of large size can compete in cost of operation with electric pits where current is supplied at the usual rates of electric current available for this service, provided the ingots are charged hot into the furnace. A heat balance sheet for a 4-hole soaking pit holding sixteen  $3\frac{1}{2}$ -ton ingots and having passed through it 648 tons per 24 hr. would be as follows, assuming a wall loss of 500 kw. per hr.

With ingots stripped hot, interiors molten, no heat required for the metal itself, the current consumption would then be 100 kw.-hr. per 27 tons of ingots, or less than 20 kw. hours per ton of ingots soaked. With ingots averaging 1650 deg., the current consumption for 27 tons per hour would amount to 1620 kw. per hour, or a current consumption of 60 kw.-hr. per ton absorbed by the metal. To this should be added 40 kw.-hr. per ton as wall loss, this higher figure for wall loss per ton of metal heated being due to the reduced capacity of the pit in tons per hour when handling the cold ingots on account of the longer time required for heating or soaking. Thus the current consumption for ingots charged at 1650 deg. would be 100 kw.-hr. per ton.

With cold ingots the heat absorbed by the metal will be 230 kw.-hr. per ton, and with a wall loss under this condition of 185 kw.-hr. per ton, 315 kw.-hr. per ton would be the current required for cold ingots. But as cold ingots are a rather small percentage of the total ingots handled in a modern steel mill, these high figures are of no serious consequence in considering electric furnaces for soaking pit operations.

It is apparent from these calculations that electric soaking pits can compete with gas-fired pits, even where moderately hot stripping and charging is practiced. Besides this the electric pit, as in the heating furnaces mentioned before, has the advantage of a non-oxidizing atmosphere, which will mean a saving of from 1 to 2 per cent of the weight of ingots put through the pit. Another advantage worthy of note is that an electric pit will take only one-third the space of a gas-fired pit of the same capacity. A feature of even greater importance than almost any other is the elimination of surface defects in the ingots, due to scale or oxidation, a matter now receiving considerable attention by steel makers.

## Large Industrial Research Laboratory Proposed

Following a personal study of industrial conditions in Germany and other foreign countries, by Dean Frederick A. Goetze and several members of the faculty of the Graduate Engineering School of Columbia University, he elaborates in his annual report the proposed plans for the foundation of a large industrial engineering research laboratory under the auspices of the university. Such a move, he sets forth, would be a boon to the industries of this country, bringing to their aid as is done in Germany, keen university research study to solve the many engineering problems which confront them and saving them millions of dollars.

The plan outlined by Dean Goetze and his colleagues calls for the immediate erection of a building easily accessible to the university, with water and railroad facilities, which with the equipment necessary would cost \$500,000. This would be but an initial step, however, as it is ultimately proposed that a research foundation of from \$2,000,000 to \$5,000,000 be secured, the income to be used exclusively for engineering research.

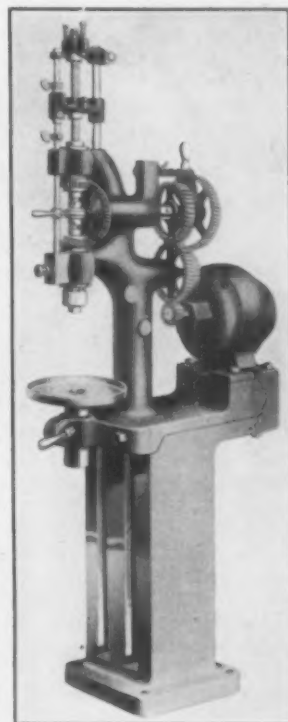
## Direct Motor-Driven Tapping Machine

As an addition to its line of automatic tapping machines the Poesse Machinery & Mfg. Company, Cleveland, Ohio, has brought out a new pedestal machine with a direct-connected motor drive. This machine is similar to the bench tapping tool made by this company and illustrated in THE IRON AGE, Sept. 2, 1915, except in the drive and gears. The latter machine was belt driven, two speeds being obtained by two pulleys on the driving shaft and different sized pulleys on the lineshaft. In the new machine the motor is bolted to the frame and the drive from the motor pinion is through change gears providing two speeds. The control for both speeds and neutral is through the lever above the gears, the illustration showing the machine with the gear guards removed.

The machine is designed for tapping either blind or through holes up to  $\frac{1}{4}$  in. in diameter and for countersinking. It taps and reverses automatically, doing away with hand and foot levers. The spindle is set in motion by drawing out the plug in front of the shifting rod and inserting it in the vertical slot, which allows the engagement of clutches on the spindle. When the hole is tapped to the predetermined depth the machine reverses automatically and the operations are repeated. The spindle can be stopped at any height desired by changing the plug to its former position. The spindle travel is regulated by adjusting two collars at the top of the shifting rod so that the depth of the hole can be quickly changed. The difference in the pitch of the tap is taken up by the compensation at the top of the spindle. A friction clutch is provided so the tap will stop in case of an overload, but the machine will continue to run and reverse as usual.

The machine is substantially built and all adjustments and operating parts are in easy reach. Bronze bushings are used in all bearings. It is 65 in. high and occupies a floor space of  $13\frac{1}{2}$  x 26 in. The clearance from the tapping spindle to the column is  $4\frac{1}{2}$  in. The vertical adjustment of the table is 8 in. and the distance from the table to the bottom of the spindle is the same. The machine is driven by a  $\frac{1}{4}$ -hp. direct or alternating current motor. It is also furnished for a belt drive, and without a pedestal for either belt or motor drive, the bench machine being 33 in. in height. This line of machines is now being placed on the market by the International Engineering Company, Cleveland, to which the Poesse Company has turned over the selling agency.

Two new Mesaba ores, the Helmer-Bessemer and the Helmer non-Bessemer, are listed in the 1916 iron-ore analysis book of M. A. Hanna & Co., Cleveland, Ohio. Another new ore listed is the Tower, a non-Bessemer ore from the Gogebic range. Two Bessemer ores, the Melrose Special and the New Era No. 1 from this range, which did not appear in the firm's last year's analysis book, are listed this year. A reproduction is given of an interesting photograph showing the miners' mess room at a 350-ft. level in the Carpenter mine in the Menominee range.



A Pedestal Type Automatic Tapping Machine Equipped with a Direct-Connected Motor Drive and a Set of Change Gears



## U. S. STEEL PENSION FUND

### Report for 1915 of the United States Steel and Carnegie Pension Fund

The fifth annual report of the United States Steel and Carnegie Pension Fund, made public last week, gives details of pensions paid in 1915 to employees of every plant or department of the Steel Corporation's subsidiaries. The distribution for the year amounted to \$659,389.42, an increase of \$147,421.52 over the distribution for 1914, and a gain of \$377,932.05 over 1911. The report shows that since Jan. 1, 1911, when the fund was established, there has been a total distribution, to retired employees of the Steel Corporation, in pensions, of \$2,234,410.75.

On account of the number of large plants of the Steel Corporation in the Pittsburgh district, the amount of money distributed in that locality to aged and infirm former employees of the various subsidiary companies is largely in excess of the amounts distributed in any other district in the country in which the corporation has properties.

To retired operatives in the Pittsburgh and Valley districts, the sum of \$368,300.50 was paid in 1915, in which amount are included disbursements to former coke workers in the fields adjacent to Pittsburgh, amounting to over \$70,000. The Cleveland district ranks next to Pittsburgh in the amount thus paid, the sum being approximately \$65,000 in Cleveland and vicinity. The Chicago district comes next, with disbursements of approximately \$53,000. In the seaboard and New England States retired employees received \$83,390.28, and on the Pacific coast \$1,122 was paid. In the South, to Tennessee Coal, Iron & Railroad Company employees, the disbursements approximated \$6,000. The ore regions of the Northwest received about \$27,000. The total amount paid to pensioners of the mining companies, including ore, coal and limestone, was slightly in excess of \$100,000. To retired employees of the transportation lines (both rail and water and Lake terminals) over \$16,000 was distributed.

Of the total amount disbursed, but slightly over \$10,000 went to former office employees. Retired Carnegie Steel Company employees drew from the fund the largest amount of any of the corporation's subsidiaries, the total being \$155,598.15; the American Steel & Wire Company coming next with \$145,281.10. The largest amount paid to pensioners from any one plant was \$35,076.44, which was distributed among the retired employees of the Edgar Thomson works; the Homestead works, also of the Carnegie Steel Company, coming next with \$33,935.50.

The report shows that on Jan. 1, 1915, there were 3002 beneficiaries of the fund, and during that year 697 pensioners were added to the list and 216 discontinued. For the year 1915 the average age of the pensioners added was 62.84 years and the average service period 28.34 years. The average monthly pensions added for the year amounted to \$20.85, this being 40 cents advance over the average for 1914.

The fund from which the pensions are paid amounts to \$12,000,000. It is made up from the old Carnegie Relief Fund of \$4,000,000, which was established by Andrew Carnegie prior to the formation of the Steel Corporation, and \$8,000,000 set aside for this purpose by the Steel Corporation. All persons who were in the employ of the United States Steel Corporation or any of its subsidiary companies on Jan. 1, 1911, or who have been employed since that date, may become eligible for pension. No pension of less than \$12 nor more than \$100 per month is paid under the rules of the fund. The plan embraces those employees who may become permanently or totally incapacitated.

The pensions are computed as follows: For each year of service the employee is given 1 per cent of his average monthly pay received during the last ten years of service. The male employees who have been in the service twenty-five years or longer and are sixty-five years or more of age, are eligible for pension. Women are eligible at the age of fifty-five years. Many of those who have retired on pensions from the corporation have taken up lighter work, and through their activities add con-

siderably to their fixed pension income. A large proportion of the pensioners have voluntarily requested to be retired, and it is only in a few cases that employees are requested to retire, and then only on the personal approval of the president of the company employing them.

## Ohio Safety Conference

The physical examination of employees was the topic that overshadowed all others at the round table conference held in connection with the Industrial Safety Exposition conducted by the Industrial Commission of Ohio in Cleveland last week. The subject proved such an interesting one that two sessions were devoted to discussing it, both employers and representatives of labor taking part in this discussion, and a considerable portion of the regular scheduled program covering other topics was omitted. It is not a long step from compulsory industrial insurance supervised by the State to the compulsory physical examination of employees, although labor has generally favored the former and opposed the latter. A movement looking toward a State law requiring the physical examination of employees, which would probably be under the direction of the State, was inaugurated at this conference. Among the speakers on the subject were T. J. Duffy, a member of the Ohio Industrial Commission; Victor T. Noonan, director of safety, and Fred C. Croxton, chief statistician, of the Ohio Industrial Commission; Dr. Sidney M. McCurdy, surgeon of the Youngstown Sheet & Tube Company; Fred L. Baumgartner, B. F. Goodrich Company, and John Voll, president Ohio Federation of Labor.

The sentiment of employers of labor and safety directors was generally in favor of physical examinations, one of their strong arguments being that an employee could not set up claims that certain physical disabilities, including injury to the eyesight, had been caused by accident when these disabilities had previously existed but had been of such a character that they were not evident except through a physical examination. As a spokesman for the employees, President Voll, Ohio Federation of Labor, stated that labor would favor physical examinations providing employers would not abuse the provisions of a law providing for such examinations and would take care of men partially incapacitated.

It was decided to refer the entire subject to a committee which will meet in Columbus in April and hold conferences with representatives of employers and employees. At this meeting an attempt will be made to reach an agreement upon the proposed physical examination law to be submitted at the next session of the Ohio Legislature. The committee named for this purpose consists of Fred C. Croxton, Dr. S. M. McCurdy, Thomas J. Donnelly, Cincinnati, secretary Ohio Federation of Labor; D. R. Kennedy, B. F. Goodrich Company, and Dr. C. D. Selby, chairman industrial health committee of the Toledo Board of Commerce.

Announcement was made during the sessions that a joint meeting of the industrial commissions of Ohio and other States will be held in Columbus at the same time as the meeting of the committee on physical examination. This will be the first time that the industrial commissions of various States will come together. The program for this meeting has not yet been arranged.

At one of the sessions the Ohio Society of Safety Engineers, composed of men engaged in actual accident prevention work and safety engineering, was organized. This is said to be the first State organization of this character thus far formed. Officers were elected as follows: President, C. E. Pettibone, safety inspector, Pickands, Mather & Co., Cleveland; vice-president, W. N. Fitch, safety director, B. F. Goodrich Company, Akron; secretary and treasurer, Fred Bennett, safety director, Buckeye Steel Castings Company, Columbus; assistant secretary and treasurer, G. P. Bender, safety inspector, Ralston Steel Car Company, Columbus.

At the close of the conference Ohio Safety Director Noonan stated that Ohio employers and employees had come closer together than ever before in the work of solving their mutual problems.

NOVEMBER FOREIGN TRADE

Exports of Iron and Steel Still at High Tide— Imports Continue Light

WASHINGTON, D. C., Feb. 1, 1916.—Exports of tonnage iron and steel in November, 1915, maintained the high level of recent months, while shipments of machinery made a new record, according to the official statistics prepared by the Bureau of Foreign and Domestic Commerce. Tonnage exports, while falling slightly below the August and September totals, show a gain of no less than 160 per cent as compared with November, 1914, and would have far exceeded all previous figures but for the fact, to which attention has heretofore been drawn, that large quantities of bars exported as such during the early months of the European war are now being converted into shells and shrapnel and returned under classifications not embraced in tonnage commodities. For the 11 months the exports of tonnage commodities show an increase of 125 per cent over the same period of 1914, which included seven months preceding and four months following the outbreak of the European war.

The high-water mark recorded for machinery exports in October, which was 25 per cent in advance of any previous record, was beaten in November by a small margin, while the gain over November, 1914, was more than 150 per cent. Shipments of machinery for the 11 months made a gain of 45 per cent over the corresponding period of 1914 and surpassed the unbeaten record of 1913 by more than 4 per cent.

MACHINERY EXPORTS

The exports of machinery in November were valued at \$15,846,119, surpassing by more than \$600,000 the high record reached in October and two and one-half times the total of November, 1914, which was \$6,204,927. Shipments of metal-working machinery, which in September and October showed a decline, yielding first place in October to steam engines, made a giant stride in November, 1915, scoring a new high record of \$4,644,713. The total for the 11 months ended November, 1915, was \$122,858,811, as compared with \$85,446,623 for the same period of 1914 and \$117,679,935 for the 11 months of 1913. One-third of the total for the 11 months of 1915 was credited to metal-working machinery, which gained more than 200 per cent over the same period of 1914.

The following table shows the total exports of machinery for the month of November and for the 11 months ended November, 1914, and 1915:

Exports of Machinery			
	1914	1915	
Adding machines .....	\$21,006	\$31,837	
Air-compressing machinery .....	35,993	37,132	
Brewers' machinery .....	5,904	5,500	
Cash registers .....	124,708	81,925	
Parts of .....	6,993	11,388	
Cotton gins .....	480	812	
Cream separators .....	17,921	13,322	
Elevators and elevator machinery .....	34,308	243,862	
Electric locomotives .....	26,184	7,600	
Gas engines, stationary .....	12,752	20,011	
Gasoline engines .....	221,336	913,508	
Steam engines .....	129,806	2,391,012	
All other engines .....	39,480	77,172	
Parts of .....	188,184	560,644	
Laundry machinery, power .....	17,692	21,694	
All other .....	14,424	18,817	
Lawn mowers .....	2,768	8,556	
Metal-working machinery (including metal-working tools) .....	1,871,171	4,644,713	
Meters, gas and water .....	22,260	138,904	
Milling machinery (flour and grist) .....	42,350	48,855	
Mining machinery .....	197,067	906,066	
Oil-well machinery .....	291,883	63,769	
All other machinery .....	45,216	133,022	
Paper-mill machinery .....	115,928	439,003	
Printing presses .....	183,049	37,474	
Pumps and pumping machinery .....	28,971	350,332	
Refrigerating and ice-making machinery .....	530,786	120,782	
Sewing machines .....	83,543	1,027,195	
Shoe machinery .....	286,326	195,552	
Sugar-mill machinery .....	132,088	24,820	
Textile machinery .....	32,330	738,007	
Typesetting machines .....	218,079	53,497	
Typewriting machines .....	38,162	32,679	
Windmills .....	5,973	52,953	
Wood-working machinery, saw mill .....	68,195	2,382,416	
All other .....	1,110,551		
All other machinery and parts of .....			
Total .....	\$6,204,927	\$15,846,119	

a Figures are for six months, January to June, inclusive.  
b Figures cover period since June 30.

The exports of iron and steel, for which quantities are given, aggregated in November, 1915, 362,765 gross tons, as compared with 140,752 tons for the same month a year ago and 176,420 tons for November, 1913. The total for the 11 months ended November was 3,159,346 tons, as compared with 1,431,748 tons for the same period of 1914 and 2,563,964 tons for the corresponding months of 1913.

While the November exports of 362,765 tons showed a gain on the October exports of 351,128 tons, they fall considerably below the figures of the three months prior to October. The exports of July were 368,893 tons; August, 401,298 tons, and September, 381,317 tons. The August figures established a record for our iron and steel exports.

Totals of the exports of tonnage iron and steel in November and for the 11 months ended November, 1915, compared with 1914, are as follows:

Exports of Iron and Steel			
	November 1914	November 1915	Eleven Months 1914
Gross Tons	Gross Tons	Gross Tons	Gross Tons
Pig iron .....	10,139	24,551	107,677
Scrap .....	1,334	4,987	31,623
Bar iron .....	462	5,766	4,842
Wire rods .....	7,110	16,359	54,421
Steel bars .....	12,344	38,783	101,005
Billets, ingots and blooms, n.e.s. ....	7,033	59,510	47,066
Bolts and nuts .....	751	2,701	14,071
Hoops and bands .....	1,500	3,968	9,248
Horseshoes .....	1,263	750	4,216
Cut nails .....	58	456	3,285
Railroad spikes .....	321	3,434	6,769
Wire nails .....	4,895	3,375	32,249
All other nails, including tacks .....	321	966	2,376
Pipes and fittings .....	.....	.....	104,487
Cast-iron pipes and fittings .....	10,231	3,034	35,314
Wrought pipes and fittings .....	8,267	10,909	48,151
Radiators and cast-iron house heating-boilers .....	202	106	3,300
Steel rails .....	9,283	58,283	171,113
Galvanized iron sheets and plates .....	4,440	4,138	37,372
All other iron sheets and plates .....	338	2,618	7,352
Steel plates .....	10,508	18,542	104,832
Steel sheets .....	5,741	5,658	113,208
Structural iron and steel .....	11,146	24,774	171,637
Tin andterne plates .....	4,837	15,538	55,572
Barb wire .....	17,791	29,638	85,514
All other wire .....	10,437	17,921	74,548
Total .....	140,752	362,765	1,431,748

a Figures are for six months, January to June, inclusive.  
b Figures cover period since June 30.

IMPORTS OF IRON AND STEEL

The imports of tonnage iron and steel amounted in November to 37,130 gross tons as compared with 24,165

Imports of Iron and Steel			
	November 1914	November 1915	Eleven Months 1914
1914	1915	1914	1915
\$1,156,304	\$495,496		
366,786	444,277		
190,256	59,040		
3,112,188	1,191,990		
59,701	95,529		
101,218	50,738		
293,244	266,623		
981,582	995,340		
604,522	206,870		
277,351	440,474		
4,655,042	6,004,481		
3,203,794	9,923,587		
653,610	949,994		
2,566,064	4,304,704		
770,492	277,130		
369,951	234,293		
.....	267,599		
12,409,049	38,831,991		
144,619	225,715		
839,115	2,082,617		
3,928,621	.....		
61,195,112	1,158,096		
61,833,507	5,236,771		
593,643	811,460		
1,855,298	1,310,474		
2,772,439	3,099,880		
538,702	736,321		
8,288,207	5,252,926		
1,042,830	1,354,619		
1,626,542	4,404,761		
1,154,352	1,700,644		
1,492,964	416,277		
7,205,806	6,523,380		
.....	787,889		
1,025,594	314,415		
452,507	957,157		
859,301	21,445,253		
16,826,240			
Total .....	\$85,446,623	\$122,858,811	



tons for the same month of 1914 and 35,810 tons in November, 1913. The total for the 11 months of 1915 was 246,994 tons, as against 280,902 tons for the same period of 1914 and 290,805 for the 11 months of 1913.

The following table shows the imports of tonnage commodities for the month of November and for the 11 months ended November, 1914, and 1915:

	Imports of Iron and Steel			
	November, 1914,	November, 1915,	Eleven Months, 1914,	Eleven Months, 1915,
	Gross Tons	Gross Tons	Gross Tons	Gross Tons
Ferrosilicon .....	251	715	5,842	4,895
All other pig iron .....	11,174	8,231	129,383	73,321
Scrap .....	3,830	18,881	32,753	59,316
Bar iron .....	790	1,001	15,261	8,236
Structural iron and steel .....	1,212	172	10,051	1,430
Steel billets without alloys .....	2	3,141	1,849	4,397
All other steel billets .....	2,788	759	36,498	9,721
Steel rails .....	2,339	3,305	22,320	77,245
Sheets and plates .....	497	268	4,241	1,308
Tin andterne plates .....	364	54	15,180	2,280
Wire rods .....	918	567	6,876	4,845
Total .....	24,165	37,130	280,902	246,994

#### GENERAL IMPORTS AND EXPORTS FOR 1915

Preliminary figures prepared by the Bureau of Foreign and Domestic Commerce show total imports of all classes of merchandise in the calendar year 1915 of \$1,778,605,855, as compared with \$1,789,276,001 for 1914. The domestic exports of 1915 aggregated \$3,489,835,051, as compared with \$2,071,057,744 in 1914, an increase of nearly one and a half billions. The excess of exports over imports in 1915 was nearly one and three-fourth billion dollars.

W. L. C.

#### Bausch & Lomb Achievements

The Bausch & Lomb Optical Company, Rochester, N. Y., confirms the report that it is erecting a new building which will enable its production to be considerably augmented. The building will be 136½ x 222 ft., one story, of brick, will take the place of building No. 6, partly destroyed by fire a few weeks ago, and since razed, and will be used for glass making and the storing of chemicals used in glass production. In connection with this information, a member of the company furnishes the following interesting statement:

"This plant was the first in America to produce optical glass successfully. We started our glass works in 1902, since which time it has grown to cover several acres and to include seven buildings, while another extension is now in the course of construction. In this plant all of our glass undergoes the processes required to put it in suitable form for grinding into every type of lens, from the minute lenses used in microscope objectives to large searchlight mirrors, several feet in diameter.

"Until quite recently, optical glass in the form of raw material was obtained from three of the European countries now engaged in the war. One other American firm attempted to produce it about 25 years ago but gave it up, and the United States Department of Commerce has also been conducting laboratory experiments in that direction for some time. We began our own experiments in optical glass making about three years ago. When the war broke out, this experimental work had reached the stage where we were ready to enlarge our plant and begin actual production. This achievement has undoubtedly marked an epoch in the development of the optical industry in America."

Although not definitely announced, it is understood that the Timken-Detroit Axle Company, Detroit, Mich., will build a large malleable iron plant to employ 500 or more men. The company's business has been so heavily increased by the demand from motor car builders for both pleasure and commercial car axles that considerable difficulty has been found in getting prompt shipments of raw materials, especially malleable castings. The proposed plant will take care of about one-half of its present malleable requirements.

#### Zinc Exports Again Increasing—Brass Exports Very Large

Zinc exports from the United States in October were among the highest recorded since the phenomenal foreign demand began, caused by the war. They were the largest since February, the increase since July having been progressive. The October exports were 11,375 gross tons, made up of 8998 tons of plates and sheets and of 1834 tons of pig and bars from domestic ores and 543 tons from foreign ores. The following table, compiled from Government data, shows the monthly exports since the war started, July, 1914, being shown for comparison:

1914	Gross Tons	1915	Gross Tons
July .....	140	March .....	7,249
August .....	3,079	April .....	7,894
September .....	17,005	May .....	6,817
October .....	9,160	June .....	8,455
November .....	11,381	July .....	7,016
December .....	16,354	August .....	6,869
January, 1915.....	13,570	September .....	9,076
February, 1915.....	13,394	October .....	11,375
Total for 15 months of the war .....		148,694 tons	

The largest recent exports for any one year were 8687 tons in the fiscal year ended June 30, 1912, the exports for the fiscal year of 1914 amounting to only 1783 tons. These compare with 119,450 tons for the year, November, 1914, to October, 1915, inclusive.

An extraordinary tonnage of zinc has also been exported as brass. The following table shows the Government statistics of exports of brass as bars, plates and shapes:

	Gross Tons
August, 1915 .....	1,958
September, 1915 .....	2,351
October, 1915 .....	2,196
10 months ended Oct. 31, 1915 .....	24,635
10 months ended Oct. 31, 1914 .....	1,731
10 months ended Oct. 31, 1913 .....	2,413
Fiscal year ended June 30, 1914 .....	2,440
Fiscal year ended June 30, 1913 .....	3,295

Recent monthly exports nearly equal the total for the normal years of 1913 and 1914, while those to Nov. 1, 1915—24,635 tons—are ten times the total for the same period in 1913.

#### Coke Exports at Nearly Record Rate

The record year for exports of coke from the United States was the fiscal year 1911, when they were 946,474 gross tons, or 78,873 tons per month. The present rate, judged by the exports for August, September and October, 1915, the latest published, is 76,112 tons per month, those for August being 83,085 tons; for September, 59,395 tons, and for October, 85,856 tons. The total for 10 months to Nov. 1, 1915, is 658,940 tons compared with 731,818 tons to Nov. 1, 1913.

Imports of coke were 9231 gross tons in August, 1915, 2982 tons in September and 4443 tons in October, making the average 5552 tons for the three months. For the fiscal year 1914 they were 112,541 tons, or 9378 tons per month, and for the fiscal year 1911 they were 143,989 tons, or 11,999 tons per month.

A chart for the rapid figuring of pipe costs has been put on the market by H. H. Beals, 51 Cliff Street, New York City. It is circular in shape with one dial revolving on another. For any percentage of discount and for different list prices the net cost per foot of pipe from ½ to 4 in. in diameter is directly obtainable. The Pipograph, as it is known, is sold for \$1 per copy and may be obtained from the Book Department of the David Williams Company, 239 West Thirty-ninth Street, New York.

The Diehl Mfg. Company, electrical apparatus, Elizabeth, N. J., has recently changed the location of three of its branch offices. Their new addresses are as follows: New York office, Singer Building, 149 Broadway, room 916; Boston office, 201 Devonshire Street, room 234; Chicago office, 1641 Edison Building. In all cases these removals were betterments both as regards space and location.



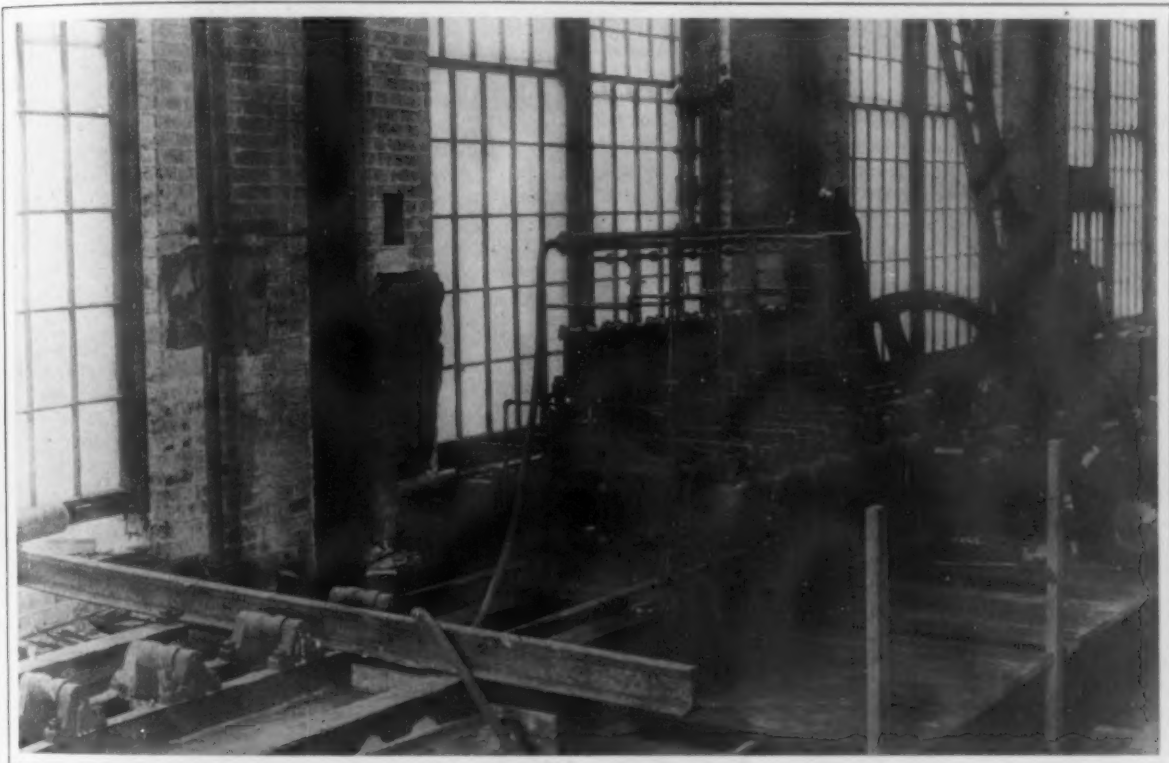
## Machine for Cutting Large Shell Blanks

The Southwark Foundry & Machine Company, Philadelphia, Pa., has developed a heavier type of cutting-off machine than the one illustrated in THE IRON AGE, Nov. 18, 1915. The two machines are practically the same in general construction and method of operation, the main point of difference being that the earlier machine would not handle bars larger than 6 in. in diameter, while the new one is designed for cutting off solid and tubular stock up to 14 in. in diameter. In a recent test of one of these machines installed at the plant of a large Eastern steel company, 3524 blanks 5½ in. in diameter were cut in 24 hr. by one of these machines. The best previous record which was made at the same plant was 3270 pieces of the same size in 24 hr.

sistance of the material being cut and the fluid pressure behind them. In this way if one or any number of the tools should become slightly dulled, this condition would automatically be taken care of as the fluid pressure would not force the tool into the work too rapidly. The fluid pressure cylinders contain pistons capable of being retracted at high speed when the pressure within the cylinder is reversed.

The bars are not cut entirely through, but a piece at the center of somewhat less than one-third the diameter of the original bar is left to conform to the specifications of the various Governments covering the preparation of projectile stock. The blanks are separated after being removed from the machine by breaking the necks of the metal left between them, this procedure being for the fracture test.

The time required to cut through a bar to the



A Heavy-Duty Multiple-Head Cutting-Off Machine for Solid and Tubular Munition Stock Up to 14 In. in Diameter in which the Tools in Each of the Eighteen Heads Are Forced Into the Stock by Air Pressure

In the accompanying illustration a multiple-head machine equipped with six three-tool air-operated heads mounted on a cast-iron or structural-steel bed is shown, together with the roll-table arrangement by which the stock is fed into the machine. A heavy motor-driven headstock is located at one end of the bed and carries the chuck, which is of the quick-acting type. There is no tail-stock on the machine, the bar being fed in, as stated, from one end and the tool heads serving as steady rests.

The cutting is done by three air-operated cutting-off tools, which are mounted in a common head. All three tools are cut in the same kerf and are forced into the work by air pressure, maintaining a constant pressure on the tool and allowing automatic regulation of the cut according to the hardness of the material handled. A point on which emphasis is laid is that if the bar is out of round the tool backs away slightly at the high spots, thus maintaining a constant cutting depth. The use of fluid pressure to hold the tools to their work, it is explained, causes them to be fed into the metal at a rate of speed which is proportionate to the re-

quired depth in seconds is approximately three and one-half times the square of the diameter of the bar in inches. It is stated, however, that in many cases the time required has been only twice the square of the diameter.

The controlling interest in the Sandusky Foundry & Machine Company, Sandusky, Ohio, has been sold by A. W. Henn of the National-Acme Mfg. Company, Cleveland, J. R. Corrigan and William E. Guerin, Jr., also of Cleveland, to W. H. Millspaugh, formerly president of the company, and Russell A. Cowles of New York. At the reorganization the three Cleveland men retired from the directorate and Mr. Cowles was elected president; Mr. Millspaugh, vice-president and sales manager; D. H. Ladd, Houghton, Mich., secretary, treasurer and general manager. Horace B. Fay, Cleveland, became a member of the board of directors.

The New York Court of Appeals has decided that a workman employed by a New York firm and injured while working for the firm in another State was a proper beneficiary under the New York compensation law. The case was that of William Post, sheet metal worker, who was sent to Jersey City to work on a grain elevator.

# Foreign Investment of American Capital\*

## Views of the Steel Corporation's President on the Place It Will Take in Building Up This Country's Trade Abroad

BY JAMES A. FARRELL

We can no longer talk of foreign trade merely as an adjunct of domestic prosperity. The fact has to be recognized that there can be no stable prosperity at home unless we are able to make liberal sales of American manufactures abroad. The surplus yield of the products of the soil practically sells itself. Whether as foodstuffs, cotton or copper, it furnishes the raw material of industry in other lands. In this department of export trade there is no competition that cannot readily be met, because the world's supply of these crude materials is not a rapidly expanding one. The more highly developed the productive capacity of a country, the more imperative is its need of these and, except ourselves, the most advanced of industrial nations cannot draw on their own resources to supply this need. The fact that in normal times about 60 per cent. of our exports consists of foodstuffs and raw materials gives a standard of measurement for the enormous possibilities of our mechanical production. When the necessities of that production and of its workers absorb all the yearly product of our farms and mines and there is none to spare for export, we may claim to have reached our full stature as an industrial people, but not before.

### FOREIGN SALES AN AID TO MAXIMUM PRODUCTION

It will not be disputed that the more complex the form assumed by the industry of any people, the more rapid must be its increase in wealth. In other words, it would pay us better to convert our own raw materials into finished products here than to sell them for conversion abroad. But our advance in that direction will be relatively slow, without a constantly broadening foreign outlet for articles of American manufacture.

To attain the maximum efficiency for our factories and workshops, they must be operated at their full capacity. Hence, on this ground alone, it is absolutely essential that we should insure against the consequences of recurring periods of domestic depression by cultivating foreign markets. It is thus as much in the interest of the workman as of his employer that provision should be made for the steady sale abroad of the products of the mechanical industry of the United States. It is in the interest of both that the capital needed in that industry should be obtainable on easy terms. But it has been shown that the condition and prospects of the foreign trade of a given industry are a factor of very considerable weight in determining the value of its securities. In fact, the foreign business of many corporations, since the war began, has been their greatest asset and the only justification for the operation of their plants on full time.

This profitable employment will end when the war ceases. The need of a foreign outlet will remain, but ability to market the product will not, as in the case of the war contracts, rest merely on ability to make deliveries. Whatever may be the nature of the competition which our manufacturers will have to meet after the war, it would not be safe to conclude that it will be less intense or less effective than heretofore. If it be handicapped by the scarcity and dearth of money, it will be stimulated by the pressure of dire necessity. If the greatly increased burden of taxation and the higher cost of living force wage conditions into a closer relation with our own, there will also be the stimulus of a struggle to regain a lost position that will spur employers and employed to the

making of sacrifices that had been undreamed of before.

### WAR HAS TAUGHT MANY ECONOMIC LESSONS

The war has taught our people many things in the domain of economic fact to which they did not give sufficient heed formerly. Not the least valuable of these lessons is the realization how strongly entrenched are our competitors in markets that some of us thought lay open for our occupancy. When the curtailment of European investment in the South American Republics brought their development to a standstill and reduced their purchasing power, we had an object lesson in the conditions precedent to the development of foreign trade. There was brought home to us the full significance of the fact that British investments alone in Latin-America had reached an aggregate of about \$4,000,000,000, which was sent there in the form of goods of British manufacture. The yearly installments which went to the making of that impressive total swelled the annual sum of British exports, as did also the proportion of the income that was left in the hands of the borrowers.

At the outbreak of the war it was estimated that Great Britain stood as the creditor of foreign countries to the amount of \$20,000,000,000. Of this, \$9,240,000,000 was invested in British dominions, colonies and possessions and \$3,160,000,000 in the United States, leaving \$7,600,000,000 for the rest of the world. Of the annual return on this vast amount, the creditor country has never taken all but has left a sum ranging between \$600,000,000 and \$800,000,000 for reinvestment.

Other countries have followed the example of Great Britain in providing foreign markets for their products, by placing them in the form of loans. The most recent estimates place Germany's investment in South America at \$1,000,000,000, with France not far behind, and Belgium and Holland figuring as large holders of the government bonds, mortgages and railroad securities of the Latin-American Republics.

The United States, up to a very recent date, has held almost no South American securities, though it has had a direct investment, through American corporations and capitalists, in the land, mining, and trading enterprises along the west and north coasts, of perhaps \$300,000,000 to \$400,000,000. The only securities of any foreign government or corporation which have heretofore been active on the New York Stock Exchange are those of Canadian and Mexican railroad companies.

### INVESTMENTS AND CANADIAN TRADE

Such experience as our people have had as lenders has demonstrated the familiar truth that trade follows the loan. Since 1897 there has been invested in Canada \$700,000,000 of American capital. It has gone into the equipment of branch plants for American manufacturers, into mining, timber and agricultural enterprises. Whatever advantages we may have in trading with Canada on the score of propinquity, ease and freedom of personal intercourse and similarity of industrial standards, American investment has necessarily created a demand for American materials, with the result that in proportion to its population Canada is the best customer we have.

In 1897 our total exports to Canada were only a little over \$57,000,000; in 1913 they were \$403,000,000. So, in a lesser degree, with Mexico, where the American capital has been freely invested. While the sales of American products there in 1892 amounted to but a

\*An address before the third National Foreign Trade Convention, held at New Orleans, Jan. 27-29, 1916.



little over \$14,000,000 they reached \$61,000,000 in 1911, and even under conditions closely akin to anarchy our exports to Mexico have averaged three millions a month.

As I have already stated, it is the export of manufactured merchandise whose increased volume must be largely dependent on the readiness of our people to invest in foreign securities. These manufactures fall naturally into two groups: the first comprises general merchandise sold to dealers and consumed by individuals whose choice is regulated only by a desire to obtain satisfactory goods at a low price. The second consists of materials for construction—machinery and equipment required for the development of extensive enterprises. The demand for these follows the possession of borrowed capital for the construction of railroads, tramways, port works, power plants, lumber mills, plantations, packing establishments, irrigation projects, mines, factories and mills. With some or all of these, it is the constant endeavor of undeveloped countries, whether in South America, the near East or the Far East, to supply themselves.

#### CONTRACTS FOR MATERIAL FOLLOW LOANS

The scale on which such enterprises are projected is a constantly growing one, and millions are now being borrowed where thousands would have been regarded as sufficient a quarter of a century ago. Frequently, the loan contracts and arrangements for the supply of material are combined in a single transaction, assuring the supply of materials to the country which provides the funds. Thus, railroads financed in London will be constructed by British engineers under specifications drawn to favor British products, and eventually British rolling stock will be operated on British rails by British officials, and a British character imparted to the demands arising from all the constructive activities stimulated along the right-of-way of a new road. Railroad enterprises promoted by German capital have similarly served German commerce. Spheres of commercial influence have thus been created to the advantage of all interests affiliated directly or remotely with the original loan.

What is true of railroad construction is true of most other enterprises based on foreign investments. A partial exception may occur in the case of loans to governments which, in the matter of constructive enterprises, are not usually required to favor specified material. In the case of China even this exception does not hold good, but in most other countries government railroads are among the few where an open market can be found for American equipment.

In dealing with the possibilities of the development of our export trade in manufactured products, it is well to remember that we meet with competitors in this field to whom its possession is a question of national existence. This is especially true in the case of Great Britain, whose dependence on a supply of food and the raw materials of industry from abroad imperatively demands the production of manufactured goods to pay for them. It is in the making of this effort that Great Britain has achieved industrial greatness, and the success with which she has done so may be inferred from the fact that in normal times the excess of her imports over exports has averaged \$700,000,000 a year. In ordinary years the excess of British imports over exports is met by the interest earned on foreign investments, the earnings of British shipping, and the earnings of the banking and insurance houses. The credits from these sources are not only found sufficient to pay for the excess of imports, but have in recent years provided a fund rising as high as \$1,000,000,000 per annum for investment abroad.

#### RESULT OF EUROPE'S FOREIGN INVESTMENTS

By Great Britain, no less than by the other industrial belligerents, the ordinary investment of capital abroad will be largely suspended during the war and must suffer a diminution of volume after it. But the argument that an impoverished Europe will require all that it can save or borrow for domestic rehabilitation overlooks the fact that Europe's foreign investments safeguard the prosperity of her industries. A loan which brings from abroad a liberal interest return,

while insuring employment for a large proportion of the industrial population, is a doubly valuable domestic asset. In this connection the fact may be noted that British manufactures are still being exported at the rate of \$150,000,000 a month.

But be the competition for foreign markets after the war more or less intense than heretofore, this fact stands out clearly: Leaving out of sight the gigantic task of repairing the material waste of war in Europe, the needs of the undeveloped countries are growing with steadily increasing rapidity. They are able to absorb, in one form or other, all the complex appliances of our modern civilization, all the aids to material comfort and well-being that we have come to regard as commonplace necessities, but with which the world at large is but sparingly supplied. The demand will not be lacking if we stand prepared to meet our prospective customers half way. We certainly never were in so good a position to take advantage of the opportunities which the world has to offer.

Since the war began, American exports have exceeded imports by \$1,864,612,581. It is estimated that \$1,500,000,000 worth of American securities have been repurchased, with a corresponding saving on the annual interest charge which we have been accustomed to remit abroad. This achievement together with the rapidly growing gold balance, the increased use of dollar exchange, and the successful negotiation of loans which have helped to readjust sterling exchange and finance munition orders, not to mention the loans to Argentina and to Canadian provincial governments, have afforded some justification for the idea that the United States is in process of replacing Great Britain as the world's banker. But, although much has been done to adapt American finance to the opportunities provided by the Federal Reserve act and by the war, little has been accomplished toward discharging the function of financing the countries which are open for the investment of American capital.

Until we are ready to take advantage of the opening which has been made for us by the drying up of the investment stream of Europe, the title of "world's banker" will not pass to the western hemisphere. Nor will practical pan-Americanism become a reality if Europe continues to be the source of the loans necessary to enable our sister republics to develop their latent resources and realize the full degree of their material prosperity. Foreign investment is a commercial-preparedness measure, a source of protection for the whole industrial fabric of our country, should the world recede to political-commercial policies of trade restriction. It is an element of strength in our influence as a nation, should a wiser instinct realize that the true guarantee of the world's peace is the provision of equal opportunity for all.

#### Points in the Commerce Bureau's Report

The first annual report of Dr. Edward E. Pratt as chief of the Bureau of Foreign and Domestic Commerce reviews in an informing and suggestive way the important developments in Government activities in the past year to extend the country's foreign trade. It very properly warns the business community against basing future calculations on conditions which war orders have brought into existence. Two great problems which must be solved, it is pointed out, are the financing of foreign trade and the training of men to carry on such trade. With one or two exceptions, the report argues, our colleges and universities are doing too little to train men for this highly important work. The instructors, as a rule, are not men who have gathered their information by personal investigation. The report takes up in detail a number of large contracts American firms have secured through the bureau's activities. Concerning tariff concessions from other countries this point is made: "We have utterly failed to make use in our foreign trade promotion of the machinery of the conventional tariff system, which our competitors have employed with great success. We have been satisfied to get most-favored-nation treatment from foreign countries, or, in other words, tariff concessions adapted to the needs of other countries and not to our own."



# Foreign Trade Council's High Water Mark

## NEW ORLEANS CONVENTION SETS THE EXPORT MOVEMENT FAR FORWARD

**A Notable Gathering Which Develops Sentiment for a Shipping Commission, a Bargaining Tariff, Co-operation in Export Sales, Better Training for Foreign Fields, and Large Investments Abroad**

*(Editorial Correspondence)*

NEW ORLEANS, LA., Jan. 29, 1916.—Few national conventions have been held which have compressed into three days' sessions so much of the pith of the country's foremost trade questions as was developed at the Third National Foreign Trade Convention, which adjourned at noon to-day. At St. Louis a year ago it was seen that in the year following the organization convention at Washington in 1914 the movement for "Greater Prosperity Through Greater Foreign Trade" had found itself; in other words, it had hit upon the lines of most effective procedure. The New Orleans convention showed that a second year had set the movement farther forward than the most hopeful prophets at St. Louis dared predict. Things that were hazy a year ago, in the multitude of suggestions about shipping, finance, tariff, and ways and means of getting trade abroad, are coming out of the fog. Men who talked at St. Louis about export sales as of some far-off thing they might have to do with some day and that was so different from their home business, in getting and handling, as almost to belong to another world, showed at New Orleans that they had more nearly taken its measure and were ready to pay the price of getting and holding it.

The conventions held by the National Foreign Trade Council pass no resolutions. That is one of their notable distinctions. It is not possible, therefore, to say in terms that the New Orleans convention took this or that stand on the questions of shipping, foreign investment of American capital, tariff, financing, sales representation, or co-operative selling as related to the export trade. Some facts and principles were made to stand out in the papers and discussions, however, and while not having the sanction of formal declarations, the following statements may fairly be set down as having the approval of a large majority of those who attended:

Judicious investments of the capital of this country should be made in Latin America and

other countries as a means of developing their resources and with a view to increasing their purchases of the products of the United States.

Congress should establish a permanent shipping board of five persons experienced in shipping and foreign trade, who shall recommend to Congress the revision of all shipping laws so as to create and maintain an American merchant marine on an equitable basis of competition with the ships of other nations. Government ownership will not meet immediate problems, as other nations have forbidden the sale of ships flying their flags and new vessels could not be secured short of two years. What is asked is not a subsidy to shipping, but the removal of existing legislative handicaps to the operation of American vessels.

The United States should have a bargaining tariff. A non-partisan commission should be created to aid Congress by furnishing exact information so that timely adjustments can be made to meet changes in foreign tariffs or trade conditions.

School courses and special training directed by manufacturing and commercial companies should be provided to a far greater extent, to equip young men to represent American interests in foreign markets.

All doubt should be removed as to the rights of American firms, whether competing or non-competing, to engage in combinations for foreign trade like those of their competitors of other nations.

No convention of manufacturers or meeting of an engineering society was ever known to stick more closely to its work than did the 500 men gathered in New Orleans. There were three general sessions on Thursday, besides two group meetings in the late afternoon; general sessions Friday and Saturday forenoon; three group meetings Friday afternoon; and at a banquet Friday night three thoughtful addresses, that called also for thinking by those who listened, took the place of the conventional brand of after-dinner speeches.

## Trade After the War—American Investments Abroad

The opening session at the Hotel Grunewald Thursday morning had as its leading feature a discussion of "World Trade Conditions After the European War," by Alba B. Johnson, president of the Baldwin Locomotive Works, who was made chairman of the convention, and addresses on "Foreign Investments of American Capital," by James A. Farrell and Percival Farquhar. Mr. Farrell's paper is given in full elsewhere.

Mr. Johnson's review of world trade conditions

after the war was able, and its outstanding points were strongly applauded. He spoke of war orders as having given employment to a vast number of men and the resulting prosperity affecting other lines that carried the revivifying influence of war orders to 95 per cent of all lines of business. When the war stops or when the first peace negotiations begin, he predicted that business of every kind will suffer dislocation. He indorsed the estimate that in Great Britain more than 1,000,000 men would

be thrown out of work within three months following peace and perhaps as many more in the United States and Canada. In this country money now employed as working capital in filling war orders will be released, and the demands from Europe for war loans will cease, so that a large amount of money will be idle until it can be absorbed in legitimate enterprises at home and abroad.

He looked for such a falling off of railroad business at the close of the war as will make railroad stocks and bonds unattractive as investments, and doubt as to the security of railroad earnings and investment will react disastrously on every other business interest. Old methods of tariff revision are incapable of providing tariffs adaptable to the changing conditions of business. Since the war we have actually created infant industries which should receive as full protection as that enjoyed in the last half century by other industries. The only practicable method of creating a tariff sufficiently flexible and scientific to meet our nation's needs is by a permanent non-partisan tariff commission. The speaker said that now many who were taking contracts for war supplies are bidding against each other for workmen, and this condition will probably become more intense. The high special rates paid have reacted on the entire labor situation; but when the war stops a readjustment of wages must necessarily follow. It is impossible to tell how long the depression following the war will last. In Europe the great demand for labor will cause a permanent advance in wages, and if that does not keep European workers at home emigration may be checked by law.

A closer union between Great Britain and her self-governing colonies may come about, and a world-British alliance would not be advantageous to the interests of the United States. Preferential trade among the allied nations may be organized, and these would make more difficult this country's struggle for export trade. Distrust of Germany, Mr. Johnson thought, would long survive. "For years I have watched with great interest the subtle methods employed by German firms for forcing their wares in South American markets, methods which would never occur to the English and which would never be approved by Americans. \* \* \* Even were the seas free to German commerce the distrust of German political and commercial morality would tend powerfully to destroy her export trade." Recovery from such distrust will come first in countries like Sweden, China, Mexico and some of the South American republics.

It must not be forgotten that the present balance of trade in our favor, amounting to \$1,500,000,000 annually, is abnormal and temporary, and our sales of war materials are made at extraordinary prices. We cannot successfully compete with British goods until we make investments in foreign countries and thus develop the opportunities other nations offer for the extension of our trade. There must be team work—correlation of the efforts of manufacturers, merchants, bankers and investors. The creation of the Federal Trade Commission must prove of great benefit to our manufacturers and exporters. This commission, the speaker felt sure, will remove all doubts as to the rights of Americans to engage in combinations for foreign trade such as are lawful to their competitors of other nations.

#### SOUTH AMERICA AS AN INVESTMENT FIELD

The paper of Mr. Farquhar on "Field for American Investment—South America," was listened to with close attention in view of the author's well known connection with South American enterprise

as head of the Brazil Railway Company. Indeed, it was commented on many times in the three days of the convention that delegates were fortunate in being able to get, for the listening, the views of so many men of experience in the various branches of foreign trade. Mr. Farquhar's paper, from which extracts will be made in these columns later, started by pointing out that the Monroe Doctrine had taken on new life and is now more firmly grounded than ever, the war having demonstrated to the nations of Latin America the necessity of solidarity in the interest of the preservation of their independence. He asked why risks should be taken of investments in the belligerent area of Europe or in what may become a belligerent area—Egypt, India and other Oriental countries—when there is a field for American investors which this country is bound to protect against outside aggression and always to keep open to us.

Investments in South America would naturally be in railroads, public utilities in cities, hydro-electric development, properties whose products are consumed in the United States, and government, state and municipal bonds. This country will be called on to replace Europe in taking the bonds formerly absorbed there. While the South American countries have suffered from depression and financial crises, they will soon be in unusually sound and healthy condition, being strengthened by large and increasingly favorable balances of trade, while their business has been adjusted to a less use of credit, and outstanding commercial and industrial indebtedness has been largely liquidated. The securities of railroads in Latin America are good investments because their concession contracts with the governments define their rights and obligations, while in the United States the Government has power to interfere in all matters, the roads having been built under general State laws without contracts.

The paper took up one by one the products of South America for which there is important consumption in the United States. The necessity Great Britain will be under of providing further exchange to cover the balance of trade for munitions and supplies furnished her by this country points to the marketing in this country of some of Europe's holdings of South American securities, of which England alone is estimated to have \$3,000,000,000. No matter how much temporary prosperity may blind us to the fact that the war in the long run will be a misfortune to the United States, we are likely to suffer at its close the greatest industrial shock of our history.

In summing up, the speaker said that as the Monroe doctrine in its widened application requires us to keep open the trade routes with South America in time of war as well as peace, it is to our advantage to make our foreign investments preferential in South America and to make it as far as possible our source of supply of raw materials and articles for which we must go abroad. This will give us the necessary return tonnage for steamship lines connecting with South America to make them profitable, permitting, if our own Government will do away with present vexatious regulations, the development of the American merchant marine to handle this traffic, free from danger of interruption or embarrassment from causes not under our control, such as present conditions. The trend of matters is to make the safety and convenience of investments in the greater stable republics of South America to become more and more as if they were made in the United States.

C. G. Young, New York, made the point that



financing in South America should be on the basis of values, not of political conditions. If investigation is sufficiently strict, the results of South American investments are satisfactory. Revolutions there are not as serious as they are sometimes thought to be and often are merely protective measures from the standpoint of the investor. In the

further discussion of the question the point was brought out that there are two classes of South American securities, those whose value is generally known and which can be purchased through any broker, and those whose value is unknown to the general public. These latter must be taken up by strong banking houses.

## Commercial Education for Foreign Trade

Thursday evening was given up to a public meeting, of which the subject was the training of young Americans for foreign posts and for other participation in the export trade. The students of the College of Commerce and Business Administration of Tulane University, New Orleans, attended, as did the bulk of the delegates, and there were present also many New Orleans business men and ladies. Dr. Morton A. Aldrich, dean of the college, in a stirring address advocated the establishment of a bureau of business practice by the Department of Commerce, a part of its work to be the devising and promulgation of studies fitting young men for export trade.

### A COMMITTEE REPORT ON EDUCATION

Wallace D. Simmons, president Simmons Hardware Company, St. Louis, presented the report of the National Foreign Trade Council's committee on commercial education for foreign trade. The committee at the outset sent inquiries to American business men who have had experience in sending commercial agents abroad or employing clerical labor in the foreign department of the home office. Many replies were received, and there was general agreement in them as to the difficulty of obtaining young Americans for export work. Many who had employed foreigners would have preferred Americans had they been obtainable. The point was made that enthusiastic presentation of American products seldom can be given by people who have not been brought up in an American atmosphere. In a number of instances, in default of specially equipped men, representatives have been chosen primarily with reference to their knowledge of the business and sent abroad to acquire the necessary foreign experience.

The unwillingness of Americans to make a career of foreign work, because this would involve permanent or long expatriation, is a serious factor in the situation. As this indisposition to take up foreign residence, now the greatest stumbling block, is overcome there will be an increased and effective demand for improved educational facilities.

Much fault was found with the instruction given in the schools of the country. Particular criticism was made of the failure of foreign language teaching and of the absence of commercial geography. Some of the writers advocated the corporation school or export clubs with lectures by business men. Many said that our schools must be adapted more closely to the needs of our modern commercial and industrial life. Various experiments are now being made in the necessary adaptation of school work to the new needs. The committee desires to co-operate with all organizations engaged in foreign trade training. The report particularly emphasized the fact that such co-operation is especially desirable because of the widespread dissatisfaction not only with the special training for foreign trade but with the more fundamental teaching in our public schools, both elementary and secondary. James J. Hill wrote the committee that his company have found high school graduates frequently unable

to write a letter in fair English, to spell correctly, or to make simple arithmetical computations either quickly or accurately.

### RECOMMENDED LINES OF TRAINING

Then came the reading by Dr. William C. Huntington, commercial agent at Chicago, of a paper prepared by Dr. E. E. Pratt, chief of the Bureau of Foreign and Domestic Commerce, which brought out the great need of trained men for carrying on this country's increasing trade in foreign countries. The paper dwelt on the four essentials in the equipment of a foreign trade specialist that can be acquired largely by training—namely, languages, principles of business, technical knowledge of foreign trade, and a thorough knowledge of one's own business. After all, the paper put the responsibility back upon the employer who must furnish the incentive in adequate remuneration and hope of promotion.

President Farrell of the Steel Corporation told of the corporation's organization for foreign trade, largely gathered together in the past fifteen years. There are now 250 foreign offices and the corporation has a system of training in offices and mills for those who are to represent it abroad. He emphasized the value of practical knowledge of the products foreign representatives are to sell, saying that though a man had command of seven languages, they would be of little value to him if he were trying to sell steel in Petrograd and did not know the difference between Bessemer and open-hearth products. He believed that manufacturing companies should give their employees every facility to acquaint themselves with the details of foreign commerce.

Another speaker was J. Rogers Flannery, chairman of the Pittsburgh Foreign Trade Commission. He described the course provided by Pittsburgh University to prepare men for the foreign trade, particularly its work in credits, finance and exchange. The speaker suggested that the National Foreign Trade Council might prepare a unified course in the essentials of a general equipment for foreign trade, leaving the carrying out of instruction under it to various local organizations and individual companies in the business centers of the country.

Ferdinand Schwedtmann, director of efficiency work for the National City Bank, New York, surprised some of his hearers with his statements of what is going on in the training of employees of that institution. There are now 242 employees in the special bank classes, 120 officers and employees in the Spanish classes, and thirty-eight taking training in French. Many of the members of the Spanish classes lunch together and at lunch time speak in Spanish exclusively. Many college men are headed for National City Bank service, 300 applications being now in for the places that will be filled by college men next year. Such employees have three hours of class room work each day and six hours of bank work.

President Vanderlip of the National City Bank



who spoke late in the evening, said that the great difficulty encountered in the establishment of branches in South America was to get enough competent men. The responsibilities connected with these branch banks are great and the men who can measure up to them are few. The opportunities opening to young men in connection with foreign trade he considered to be extraordinary. The question now is whether American young men will equip themselves to take advantage of them. He raised the question whether in the training given in Southern cities, of which a previous speaker had told (Charles Lyon Chandler, of Chattanooga, South American agent of the Southern Railway) too much emphasis was not being put on Spanish. Russia is a great market and there are other fields for which men should be in training. Mr. Chandler stirred up a good deal of enthusiasm with his account of what is being done in Chattanooga. In that city 500 persons are studying Spanish with a view to its use in foreign trade; of these 176 are in the high schools. At Brunswick, Ga., he said,

150 young people are studying Spanish. The work at Chattanooga is unique. The young men in training there are informed in detail as to the various Chattanooga products which go abroad, learn of their nature and use and see them packed for shipment. It was said that for its size Chattanooga is sending more, and more varied, products abroad than any manufacturing city.

W. H. Lough, New York, formerly of the School of Commerce of New York University, made the point that training of young men for foreign trade need by no means be confined to large corporations like the Steel Corporation, the National City Bank or the Standard Oil Company. He told what smaller manufacturers could do to supervise the study and development of their employees to acquaint them with the foreign trade. An interesting comment was made by H. K. Mulford of Philadelphia on the organized work of manufacturers in that city, including classes meeting two nights in the week for the study of Spanish, transportation, finance and other phases of exports.

## For a Merchant Marine Commission

The session devoted to the American merchant marine left no doubt as to the position of 95 if not 100 per cent of those who attended. The appearance of Robert Dollar, the veteran San Francisco ship owner, and his advocacy of a Government policy which would release American shipping from the handicaps it now suffers was the most interesting incident of the convention. His rugged figure and straightforward putting of the situation, every point being clinched by facts drawn from his long experience, made a powerful appeal. As he finished an address of more than a half hour, which was as much impromptu as a digest of his prepared paper on the development of a national shipping policy, there was the greatest demonstration of the convention, delegates jumping to their feet to emphasize their tribute of admiration and affection. He took the floor in part to present his own views of the present shipping crisis and the steps that should be taken in dealing with it and in part to answer the address of Assistant Secretary of Commerce Sweet, who appeared in advocacy of a Government owned merchant fleet.

Captain Dollar said that in connection with what has been said about the boom in American shipbuilding as providing new tonnage for the American merchant marine, it is well to bear in mind that out of 98 steamers of 3000 gross tons or above, which were building or had been ordered in American shipyards on Dec. 1, 1915, only 40 were intended to carry cargoes or passengers, the remainder being divided between 47 oil tankers and 11 colliers, not available for carriage of general merchandise. Of the 40 steamers for cargo and passenger traffic the great majority were intended for the trade between our eastern and western coasts through the Panama Canal or to such nearby foreign ports as those of the West Indies and Mexico. Nowhere are steamers building to compete with the European owned steamers that in the past have carried our exports to the more distant markets of the world. He took up the proposals now discussed; first, Government ownership; second, equalization of operating costs under whatever form of direct assistance to shipping; third, the development of a truly national shipping policy along lines recommended by a permanent non-partisan shipping board after businesslike consideration of the country's real shipping necessities. Referring to Government leasing of vessels to

operating companies, he said the only course would be to make the leasing price low enough to offset the excess of operating cost over that of our competitors. Somebody must pay, and under government ownership it will be the taxpayer. The speaker strongly advocated the establishment of a permanent shipping board composed of five members, experienced in shipping and foreign trade, which shall recommend to Congress the revision and modernization of all federal laws relating to shipping.

### GOVERNMENT OWNERSHIP AND LEASE

Mr. Sweet, who explained that what he said represented his own views, though his official position could not be left out of the account by his hearers, presented the advantages of government ownership of merchant vessels. It is for the Government, he argued, to provide an increased number of auxiliary vessels for the navy, and the practical question was what to do with those vessels in time of peace. He saw more clearly than ever, as the export trade figured more and more in our national plans, that in this shipping question the welfare of all our people is concerned. He did not believe there was any necessary competition between auxiliary vessels of the Government operated in foreign trade and those of individuals engaged in shipping. He deprecated the idea that the Government was going wholesale into shipping and therefore would put everybody else out of business. The proposal was to invest \$50,000,000 in auxiliary vessels and to lease these vessels to private operators with the proviso that the Government can take them over in time of emergency. The sailors would be American citizens and the contract would provide that they would go with the Government in time of need. He agreed with the proposal for a non-partisan expert commission, but would have on it men not directly engaged in shipping, who should formulate a plan by which our merchant marine can be built up.

### MERCHANT MARINE COMMITTEE'S REPORT

The report of the Merchant Marine Committee of the Foreign Trade Council was presented by its chairman, James A. Farrell. This was adopted on Sept. 23, 1915, and has already been published. In a supplementary report, prepared expressly for the convention, the committee compared the present

conflict of opinion regarding a federal shipping policy to the chaotic condition of the banking and currency question a few years ago. The National Monetary Commission did much to pave the way for the Federal Reserve Act; similarly the committee believed, a permanent non-partisan shipping board could recommend to Congress a policy which would establish a prosperous American shipping in the foreign trade. Every argument that calls for the creation of a tariff commission and every beneficial result that flowed from the National Monetary Commission argues, the committee believes, for a commission on the shipping problem.

#### GROUP MEETING

The more informal discussion of the shipping question was carried further in a group meeting held Friday afternoon. Assistant Secretary Sweet was present and argued again for some form of agreement as to the steps to be taken in the present crisis. There were references again to the La Follette act and the demand for its repeal. Mr. Sweet had argued that the shipping commission which had been proposed should be made up of

men not directly connected with shipping. He had in mind, he said, at least two men who are thoroughly informed from an experience of years in the business, but are not now interested in vessel property. The contention of Captain Dollar and others was that the non-partisan board should be composed of men experienced in shipping and in foreign trade. In the group meeting Captain Dollar emphasized strongly the fact that what was wanted was not Government aid, but the removal of all the disabilities under which ship owners flying the American flag are laboring. They must be free to compete on even terms with merchant vessels of other countries. He cited the payment of \$500 more in Panama Canal tolls by one of his own vessels which was flying the American flag, than was paid by a sister ship of British registry, solely because of the American regulations as to measurement. He had asked the captain of a vessel he had under British register, and which he proposed to put under the American flag after the act of Aug. 18, 1914, how much more the cost of operation would be and a computation showed the amount to be \$1,400 a month.

## The Tariff and World Trade Conditions

The convention's consideration of tariff questions was entirely non-political. In fact it is one of the underlying principles of the National Foreign Trade Council that its activities are to be kept non-political and non-partisan. The paper of Willard Straight, New York, vice-president of the American International Corporation, on the relation of the tariff to world trade conditions after the war, was presented to the convention by Dr. Richard Pearson Strong, of the same corporation. Mr. Straight referred to the plans on foot for commercial alliances between members of the respective groups of belligerents after the war, Russia having already suggested a commercial agreement between the allies to prevent the rehabilitation of German trade. This country is giving little heed to the problems of the future, but steps must be taken to meet the competition of rehabilitated Europe in the trade of the world. Our program of trade development should include a constructive financial policy and the wisest administration of the tariff. At present three-fourths of our imports come in free and thus we are handicapped in obtaining preferential rates for articles which we wish other countries to purchase from us. The possible revision of the tariff schedule has therefore come up. Our foreign trade demands a more flexible system than a single level tariff and Congress should provide permanent machinery for tariff changes accommodating the national interest to sudden or gradual developments in world trade.

The author suggested the establishment of a dual tariff system which would enable the United States to bargain with other countries for reciprocal arrangements. Precedent to this it might be well to impose a duty on many articles now free listed so that this duty might again be removed in return for tariff concessions on our products. The real struggle this country must now anticipate is a financial and commercial struggle. While our present prosperity gives us a decided advantage, we must put ourselves in a position where we may effectively deal with the mobilized activities of our competitors for world trade.

Much of the paper of Prof. Henry C. Emery, formerly chairman of the United States Tariff

Board, on the necessity for an anti-dumping law, we shall print later. It was one of the most thoughtful papers of the convention and opened up some problems in connection with dumping whose bearing has not been generally appreciated. Professor Emery found a very enthusiastic response from his audience when he said that the United States must quickly get busy on one thing, and that is a bargaining tariff, a tariff that will help this country to get its products into outside markets.

In the group meeting which dealt with the United States tariff system and foreign trade there was quite general agreement in the view that the tariff of this country must have sufficient flexibility to permit of adjustment to the changing fiscal policies of other nations, particularly to the adjustments which will follow the European war. A non-partisan tariff commission was favored as the best means of affording to Congress authentic and timely information on international market conditions and the policies of other governments. In this group meeting a motion was passed asking the Foreign Trade Council to appoint a committee to give careful consideration to the subject of a bargaining tariff.

#### Other Convention Features

The question of cooperation in foreign trade was most intelligently discussed, as was also that of the best means of extending the export business of smaller manufacturers. An excellent paper was presented by M. A. Oudin, manager of the foreign department of the General Electric Company, Schenectady, N. Y., who in discussing "Export Cooperation to Meet World Trade Conditions After the War," described the cooperative methods of other countries. He pointed out that most of the European export trade is actually handled by exporting houses having foreign connections, of which there are some thousands in England and Germany, many of which are handling competing lines. In the United States the number of export houses is limited and it is not possible to develop cooperative effort except with the slow lapse of time. He thought it a mistake to minimize the practical diffi-



culties in the way of our manufacturers taking full advantage of any opportunity that may be given them to form joint selling agencies and joint export combinations.

Chairman Davies, of the Federal Trade Commission, drew hearty applause when he said in his banquet speech Friday night that enterprise in foreign trade should not be hampered by the prevention of cooperation by American firms; that "in the absence of injury to any American interest a greater degree of cooperation in export trade than is allowed in domestic trade may be beneficial to the country"; also that "if this is not now permitted by law new legislation to that end, properly safeguarding the public interest, should be enacted."

In the group session devoted to cooperation and the interest of the smaller manufacturer an illuminating discussion was presented by Gilbert H. Montague, a New York attorney, of "Export Trade and the Anti-Trust Laws; the Legal Status Today and Some Proposals for Relief."

H. C. Lewis, general manager of the National Paper & Type Company, New York, whose paper at the St. Louis convention of last year on "Co-operative Foreign Selling for Smaller Manufacturers" received much favorable comment, presented at this week's convention an equally important paper on "Detail of Co-operative Foreign Selling—How Business May Be Fairly Divided." He took the ground that contracts made in this country for the exclusive sale of certain goods abroad should be fully protected by law. The present uncertainty as to the power of a manufacturing company to forbid a domestic dealer to sell its goods in a country in which it has an exclusive contract with another concern should be removed. He also considered it desirable that the Department of Commerce should distribute its information and inquiries to concerns really and legitimately engaged in foreign business.

Henry Howard, vice-president Merrimac Chemical Company, Boston, argued in a well constructed paper the "Necessity for an American Dyestuffs Industry to Aid Export Trade in Textiles." He showed how foreign manufacturers of aniline oils, when in 1913 a duty of 10 per cent was put on such oils, lowered the price to a point where the business showed a loss to the American manufacturer. He noted that the Administration has under consideration legislation to prevent such unfair competition.

### A Harbor Excursion

New Orleans is the second port in the United States. That fact and its nearness to the Panama Canal and to the Latin-American republics on which so much of this country's thought on foreign trade is centering, made its selection as the convention city highly appropriate. And while these conventions are dead-in-earnest affairs, with no time for that type of local cultivation and so-called "entertainment" that cheapen so many trade gatherings, the delegates were entirely open-eyed to the new physical attractions of New Orleans and the other evidences of the progressive spirit of its people. Some of the flavor of the old French Creole days is gone from the city of to-day, but much that is forward-looking has taken its place. The systems of sewerage and drainage and the municipally owned water works and filtration plant which takes the water of the Mississippi and converts it into excellent drinking water were all of much interest to the visitors. To hear of municipally controlled docks with modern steel sheds on the wharves was for those who were making their first

trip of years to New Orleans to know that a modern and aggressive spirit is shaping the city's destinies.

The only approach to the ordinary convention junket—and this was by no means ordinary—was the trip taken Saturday afternoon on a United Fruit Company steamer up the Mississippi River to inspect the great cotton warehouses built by the Board of Commissioners of the port of New Orleans. The site contains about 90 acres, of which 24 acres are occupied by the present steel and concrete warehouses, the whole built at a cost of \$3,000,000. The new methods of mechanically handling, automatic weighing and conveying and the operations of the three enormous 30-ton compressors were seen on this trip. Of particular interest was the mechanical puller, which makes possible the extraction of bales deep down in the pile, with several tons weight of cotton above them.

### Delegates from Iron and Metal Working Trades

Of those attending the convention over 450 registered. The following were among those representing firms in iron and steel and machinery lines, or allied interests:

W. W. Anderson, Oil Well Supply Company, Pittsburgh; Jay I. Andrews, Am. Sheet & Tin Plate Company, Pittsburgh; M. C. Atwood, Western Wheeled Scraper Company, Aurora, Ill.

E. A. Baldwin, General Electric Company, Schenectady, N. Y.; L. E. Bihler, Carnegie Steel Company, Pittsburgh; G. A. Bollensen, Felt & Tarrant Mfg. Company, Chicago; Frank N. Boyer, General Electric Company, St. Louis, Mo.

J. R. Calkins, Electric Wheel Company, Quincy, Ill.; E. L. Clapp, Willys-Overland Company, Toledo, Ohio; Wm. W. Coleman, Bucyrus Company, Milwaukee, Wis.; J. J. Cone, Robert W. Hunt & Co., New York, N. Y.; Maurice Coster, Westinghouse Elec. Expt. Company, New York, N. Y.; George G. Crawford, president Tennessee Coal, Iron and Railroad Company, Birmingham, Ala.

A. T. De Forrest, United States Steel Products Company, San Francisco; T. V. Douglass, secretary American Manufacturers' Export Association, New York.

Dan P. Eells, Bucyrus Company, Milwaukee, Wis.; S. St. J. Eshleman, Staufer-Eshleman Company, New Orleans.

A. B. Farquhar, York, Pa.; Percival Farquhar, Brazil Railways Company, New York; James A. Farrell, president United States Steel Corporation, New York; A. I. Findley, THE IRON AGE, New York; Stanley G. Flagg, Jr., Stanley G. Flagg & Co., Philadelphia; J. Rogers Flannery, Flannery Bolt Company, Pittsburgh.

Alfred H. Gawthrop, American Car & Foundry Company, Wilmington, Del.; George M. Gillette, Minneapolis Steel & Machinery Company, Minneapolis, Minn.; John M. Glenn, secretary Illinois Manufacturers' Association, Chicago; N. J. Gould, Goulds Mfg. Company, Seneca Falls, N. Y.; E. E. Green, American Bridge Company of New York, St. Louis.

H. F. Griffith, Westinghouse Electric & Mfg. Company, Pittsburgh.

E. T. Harris, Payson Mfg. Company, Chicago; H. L. Harry, Harry Brothers Company, New Orleans; S. T. Henry, vice-president McGraw Publishing Company, New York; H. G. Hergert, Pekin Wagon Company, Pekin, Ill.; W. S. Horner, American Rolling Mill Company, Pittsburgh; C. F. Huhleln, B. F. Avery & Son, Louisville, Ky.

F. H. Jones, International Steam Pump Company, New York; Peter Jenet, Jenet Bridge & Iron Works, Chicago; Alba B. Johnson, Baldwin Locomotive Works, Philadelphia; F. R. Johnson, Standard Sanitary Mfg. Company, Pittsburgh.

W. C. Kretz, John A. Roebling's Sons Company, Trenton, N. J.

Frank J. Llewellyn, American Bridge Company, Chicago; W. D. Loomis, Cadillac Motor Car Company, Detroit, Mich.; Alexander Loquin, Petrograd Metal Works Company, Pittsburgh.

E. S. Maddock, Willys-Overland Company, Toledo, Ohio.; John J. Mapp, National Enameling & Stamping Company, New York; E. J. Mehren, editor *Engineering Record*, New York; Porter J. Millikin, Union Iron Works, Decatur, Ill.; E. G. Miner, Pfaunder Company, Rochester, N. Y.; L. E. Moen, C. W. Hunt Company, New York; Thomas Molanphy, United States Steel Products Company, Santiago, Chili; Charles M. Muchnic, vice-president American Locomotive Sales Corporation, New York; John McLeod, Carnegie Steel Company, Pittsburgh.

N. O. Nelson, N. O. Nelson Mfg. Company, Edwardsville, Ill.; W. W. Nichols, assistant chairman Allis-Chalmers Company, Milwaukee, Wis.

M. A. Oudin, General Electric Company, Schenectady, N. Y.; J. F. O'Neill, Fulton Iron Works, St. Louis; John F. O'Connell, United Shoe Machinery Company, Boston.

John A. Penton, Penton Publishing Company, Cleveland, Ohio; Carl H. Peterson, Baldwin Locomotive Works, St. Louis.

Robert Radford, Standard Steel Works, Philadelphia; J. L. Record, Minneapolis Steel & Machinery Company, Minneapolis, Minn.; George D. Roper, Eclipse Gas Stove Company, Rockford, Ill.; A. E. Rowe, Malleable Iron Works, Bradford, Conn.

Wallace D. Simmons, president Simmons Hardware Company, St. Louis; L. S. Smith, American Laundry Machinery Company, Cincinnati; H. Sanborn Smith, Gulf States Steel Company, Birmingham, Ala.; N. W. Snow and William W. Snow, Ramapo Iron Works, New York; Hamilton Stewart, Harbison-Walker Refractories, Pittsburgh, Pa.; Charles F. Stone, Atlantic Steel Company, Atlanta, Ga.; C. W. Stone, General Electric Company, Schenectady, N. Y.; Charles H. Strawbridge, Goodman Mfg. Company, Chicago.

Eugene P. Thomas, President United States Steel Products Company, New York; E. A. Turner, Northwest Export Metal Company, Chicago, Ill.

E. A. Usina, Charles A. Schieren Company, New Orleans. Matheas R. Vanderkloot, South Halstead Street Iron Works, Chicago; Theodore O. Vilter, Vilter Manufacturing Company, Milwaukee, Wis.

W. V. Wrightson, National Tube Company, New York; Stillman W. Wheelock, American Sheet & Tin Plate Company, New Orleans; R. T. Williams, Willys-Overland Company, Toledo, Ohio; C. H. Wolfe, Aluminum Company of America, Pittsburgh.

### Notes

The convention was fortunate, as was that at St. Louis last year, in having for its chairman President Alba B. Johnson of the Baldwin Locomotive Works. He was admirable in keeping a steady hand upon the convention machinery, facilitating free expression on the matters discussed but at the same time firmly enforcing the time limit and preventing any lag or loss of interest.

The speakers at the banquet Friday evening were Frank A. Vanderlip, president National City Bank, New York; Fairfax Harrison, president Southern Railway Company, and Hon. Joseph E. Davies, chairman of the Federal Trade Commission, Washington.

The marvel of President Farrell's activities in behalf of the general business interest, in view of the great burdens he carries for the Steel Corporation, was a subject of fresh comment in the convention here. He has given a vast amount of time and thought to the work of the Foreign Trade Council and the convention was not slow in its recognition of that service.

Through Robert H. Patchin, its secretary, to whose excellent work in organizing the convention preliminaries and program so much of its educational value is due, the continuity of the National Foreign Trade Council's work is kept up. The council is composed of fifty members, from various sections of the country, who represent the merchant, manufacturing, agricultural, railroad, shipping and banking interests engaged in foreign trade. The headquarters are at 64 Stone Street, New York.

Men who have attended trade conventions for years regard the one which closed its sessions today in many respects the greatest business gathering in the country's history and one that stands out for the caliber, representative character and determined purpose of its participants. A. I. F.

Brazil, by a decree made public Dec. 16, 1915, not only forbids the sale of any ships flying the Brazilian flag to foreigners during the war, but the entire fleet is declared expropriated to the benefit of the federal government.

## One Year's Results of a Swedish Electric Pig-Iron Furnace

Electric smelting of iron ore in Sweden is no longer in the experimental stage. Several types of furnaces are now in successful operation. After the experimental work at the Domnarfvet works in 1909 and 1910 the Association of Swedish Ironmasters constructed an Electrometals furnace of 2500 to 3000 hp. at Trollhättan, Sweden. It was operated for experimental tests during 1911 and 1912; details of these tests were given in the reports of J. A. Leffler and others in the years 1911 and 1913.

A detailed report for 1913 is given in a recent bulletin, "Electrothermic Smelting of Iron Ores in Sweden," by Dr. Alfred Stansfield and issued by the Canadian Department of Mines. A summary of this report, giving operations for one year, is as follows: In 1913, 9,381,980 kg. of lump ore, 2,182,575 kg. of concentrates and 1,001,155 kg. of limestone were smelted with 2,634,355 kg. of charcoal. The gross electrode consumption was 34,039 kg. and the pig-iron produce was 7,333,995 kg. Per metric ton of pig iron, this is a consumption of 1279 kg. of lump ore and 299 kg. of concentrates, together with 136 kg. of limestone, 359.2 kg. of charcoal and 4.64 kg. of electrodes.

During the production of this pig iron the furnace was operated 7970.6 hr. and shut down 789.4 hr., with an entire current consumption of 15,838,250 kw. hr. or 2160 kw. hr. per ton of iron, including that for lights and motors, or 2116 kw. hr. for the furnace alone. The daily pig-iron output was 20.08 tons or 3.05 tons per kilowatt year of power for the furnace only, and 2.98 tons per kilowatt year of power for the whole plant. The composition of the iron produced was as follows:

	Per Cent
Silica .....	0.05 to 1.00
Manganese .....	0.15 to 0.20
Sulphur .....	0.005 to 0.015
Phosphorus .....	0.020

During the time covered by the report the hearth and roof were relined and the furnace reheated.

### The German Labor Situation

The situation of the German labor market is outlined in a report for October in the November issue of the official labor organ issued under the auspices of the Imperial Statistical Board in Berlin. Dealing with males it shows a reduction of 76,691 or 1.69 per cent in the number employed on Nov. 1, 1915, as compared with Oct. 1, while the female numbers increased by 66,948 or 1.84 per cent as against an advance of 0.23 per cent in the previous month. Taken together the total number of employees decreased by 9473 or 0.12 per cent as compared with 0.88 per cent in the preceding month. Prisoners of war, employed in industrial work, are not included.

In general the report states that after the German industries had accommodated themselves to war conditions, very few changes were shown month by month and that apart from the textile and building trades, the general course of business was satisfactory. The most active employment was in mining and in most branches of the iron and steel and machinery industries. In other trades the situation was not uniform, some showing great activity and others less occupied.

High-pressure steam and stationary plants furnish nearly half of the smoke discharged into the atmosphere of Chicago, according to a committee which has made a four-year study of the electrification of railroads in Chicago. Low-pressure steam and other heating plants, it is stated, contribute 19.2 per cent of the smoke, while furnaces for metallurgical manufacturing and other processes 18.83 per cent, leaving about 13 per cent to be divided between steam locomotives and steam vessels. The attempt to apportion the sources of smoke so exactly is a commentary on the thoroughness of research attempted by the committee. Incidentally, railroad authorities naturally feel that the smoke from locomotives is not sufficiently great to be an argument for the electrification of the railroad lines.



### Frederick H. Eaton

Frederick Heber Eaton, president American Car & Foundry Company, died Jan. 28 at his home in New York City, aged 54 years. He was born in Berwick, Pa., and received his education in the local public schools.

In 1880 he began his business career as a clerk in the offices of the Berwick Rolling Mill Company, later transferring his activities to the Jackson & Woodin Mfg. Company. He thus became interested in the car-building industry and was one of the founders of the



FREDERICK H. EATON

American Car & Foundry Company in 1899. He served as first vice-president of this company until June, 1901, when he became its president. In addition to his manufacturing interests, he was a trustee of the Mutual Life Insurance Company, a director of the Columbia Trust Company, Seaboard National Bank, Hale & Kilburn Company, Susquehanna, Pa.; Bloomsburg & Berwick Railroad, of which he was also vice-president; Hoyt & Woodin Mfg. Company, Sligo & Eastern Railway, American Agricultural Chemical Company, American Beet Sugar Company and National Surety Company.

Mr. Eaton was a member of the Chamber of Commerce and of the Union League Club of Philadelphia, the Racquet Club of St. Louis, the Union League, New York Athletic, Metropolitan, 'Engineers', City Lunch, City Midway and Railroad clubs of this city, Automobile Club of America, and Rumson Country, Ardsley, Deal Golf and Country, and the Sleepy Hollow Country clubs. He was also a member of the Pennsylvania Society of New York, Society of Colonial Wars, Sons of the Revolution, Economics Club, American Geographical Society, American Society of Political and Social Science, Academy of Political Science, Peace Society, Navy League, New York Geological and Geographical Society and India House. He leaves his widow and a daughter.

Figures compiled for 1915 by the Commonwealth Steel Company, Granite City, Ill., show that during the year the plant was operated without a single accidental death and with no serious accidents. The company has paid especial attention to safety-first devices and is one of the leaders in that respect in the West.

The fire loss within the Panama-Pacific Exposition grounds, covering the period of construction as well as of operation, was only \$250, according to the chief of San Francisco's fire department. The temporary city comprised 443 buildings, all of frame construction save two.

### John Fulton

John Fulton, from 1888 to 1892 general manager of the Cambria Iron Company, died at his home in Johnstown, Pa., Jan. 20, in his ninetieth year. He entered the service of the Cambria Iron Company in 1874 on the invitation of Daniel J. Morrell, then general manager, as general mining engineer, following some seventeen years of work in opening up the Broad Top coal field in Huntington and Bedford counties, Pa., in connection with engineering work on the Broad Top Mountain Railroad. In 1887 he became general superintendent of the Cambria Iron Company and a year later its general manager. It was through him that the company went to the Connellsville region for its coking coal and later to the Lakes for iron ore.

He was born Oct. 16, 1826, at Drumard, Tyrone, Ireland, of Scotch-Irish descent. He studied civil engineering in Dublin and was subsequently employed in the survey and construction of the Great Midland Western Railway from Dublin to Galway. In 1848 he accompanied his family to America. Early in his professional work he became engaged in canal work and in 1854-1855 he was assistant engineer on the construc-



JOHN FULTON

tion of the junction canal uniting the Pennsylvania and New York State canal systems. While identified with the Broad Top railroad work in the years immediately following, he was picked out for signal honor by Prof. J. P. Lesley, geologist of Pennsylvania, to complete a topographical and geological survey of the Broad Top Region in the mapping of Cambria and Somerset counties. In 1870, Lafayette College conferred on him the degree of A. M.

From his study of coke as a blast furnace fuel, he expanded and tabulated his experience in a book published in 1895, entitled, "A Treatise on the Manufacture of Coke and the Saving of By-Products," which book went into a second edition in 1905. On retiring from the service of the Cambria company in 1892, he united with Isaac Taylor in establishing a coke works near Uniontown, Pa. In his later years he devoted himself to general professional work on coal, iron ore and mineral enterprises. He was also active in public and religious institutions of Johnstown. He was until lately a member of the American Institute of Mining Engineers, and contributed a number of papers to it.

Iron-ore mines in the valley of Cogne, Italy, are said to contain much more than the estimated 5,000,000 tons according to recent investigations.

## GHOSTS IN STEEL FORGINGS

### An Unusual Segregation—Their Formation, Effects and Composition

An account of various investigations which Prof. J. O. Arnold has carried out in the last twenty years on the phenomena of "ghost lines" in forgings from large steel ingots ranging in weight from 40 to 80 tons, was recently given by him in a paper before the Institute of Mechanical Engineers (British). An abstract follows:

During turning operations certain lines, commonly called "ghost lines," an exact knowledge of the nature and method of formation of which is of great importance both to steel metallurgists and to naval engineers, usually show up white and in slight relief against the steel-gray color of the mass of a forging. By means of a sharp engraver's tool they may be dug out and analyzed along with portions free from them. In one case analysis showed that in portions of a forging showing ghosts the percentages of carbon, silicon, manganese, sulphur and phosphorus were all enhanced as compared with ghost-free portions, and if the figures for the latter were taken as 100 per cent. the inclusion in the steel shavings of some ghost lines had raised the carbon 19, the silicon 287, the manganese 35, the sulphur 125 and the phosphorus 44 per cent. Thus there was an apparent segregation of all fine elements, but it is now known that the elements showing true segregation are carbon, sulphur and phosphorus. The silicate of manganese, or possibly bisilicate of manganese and aluminum, which was present was probably formed while the steel was running down the lander from the furnace, and were incidentally involved in the steel. Many large ghosts are almost free from silicates.

#### GENESIS OF GHOSTS

In a big ingot, irrespective of the liquated and scrapped upper third, in parts of which the phosphorus, for example, may exceed 1 per cent, there is always more or less segregation of the mobile elements, carbon, sulphur and phosphorus to a series of centers. The mobility of carbon is about five times greater than that of sulphur, phosphorus or nickel. In forging the ingot the angular structure is broken up, while the modular segregate is drawn out into a dark-etching rod. In such a forging the elongated segregation, which is relatively hard, is in the turning operations, jumped by the tool, leaving in faint relief a relatively white line; hence the machinist's somewhat far-fetched name "ghosts." A decarbonized white ghost is relatively soft and is dragged by the tool, thus leaving a faint depression. During the prolonged cooling, at a low red heat, the carbonized ghost becomes decarbonized, the dissolved phosphide of iron apparently expelling the hardenite (transformed pearlite) to the edges of the ghost lines, and the final product is the decarbonized ghost line. Hence the ghost has become essentially a broken and irregular cylinder of pearlite, filled with pale brown-etching ferrite containing emulsified phosphide of iron, through which are scattered short rods of dove-gray sulphide of manganese.

#### MECHANICAL EFFECTS

Careful mechanical tests lead to the conclusion that ghost lines are little detrimental to the mechanical properties of structural steel so long as the plane of stress is at right angles to the direction of the ghost lines—in other words, when the material is in tension or torsion or alternating stresses. Examination of eight tensile, eight torsion and 48 alternating stress test pieces from a propeller shaft forged from the lower end of an 80-ton ingot, revealed at the respective points of rupture no signs of cracking or opening due to ghost lines or any other cause, and thus no risk would be incurred in putting such a shaft in operation.

#### SOME LARGE SPECIMENS

Comparatively recently the author had the opportunity of ascertaining the exact nature of unforged

ghosts, some of which were  $\frac{5}{8}$  in. in diameter and 9 in. long. The casting of a mild steel chrome-nickel ingot weighing with its feeding head about 57 tons, was just completed when a burst-out occurred at the bottom. This was stopped in two minutes, but when the ingot was cold it was found to be hollow for 21 in. down, having "bled" about 17 tons of steel. On cutting off the hollow portion of the ingot, which was 60 in. octagon at the top and 46 in. octagon at the bottom and 156 in. long, and dividing this portion longitudinally into four pieces, a series of protruding frozen ghosts, perhaps 50 in number, was discovered in each octagonal angle, some of them protruding to the extent of  $\frac{3}{4}$  in. The surfaces of the steel free from ghosts, showed decisive projecting indications of octahedral crystallization. The ghosts seemed to have caught on the angle where the body of the ingot turns upward to the feeding head, and the author at first supposed that they had been mechanically trapped on what may be termed a series of metallurgical futtock shrouds. Further consideration, however, inclined him to the view that after casting at a position at the top of each ultimate ghost line, there was a segregate of roughly globular form, and that these segregates by the downward rush of molten metal at the burst-out, were drawn out into elongated masses, in a manner similar to hammering or rolling. The masses of segregate apparently migrated into the angles because the steel in those angles was at a higher temperature than that on the slightly radial sides of the octagon, owing to the greater thickness of steel lagging the fall of temperature in the angles.

#### CHEMISTRY OF FORMATION

With so much material available it was easy to make chemical and microscopical examinations, and these showed the ghosts to be compound and variable segregates, marked segregations of carbon, sulphur, phosphorus and nickel having taken place. The chemical figures are surprising. It has hitherto been generally accepted that ghosts, being higher in carbon, sulphur and phosphorus than the main body of the steel, necessarily freeze last, but the data obtained in the present research prove conclusively that the ghosts freeze first at many degrees above the freezing point of the main mass. The author on a previous occasion showed the existence of a definite solution of the compound of iron and sulphide of manganese, which appeared to freeze above the main mass of the ingot and on cooling broke up into a mixture of iron and dots of sulphide of manganese. The composition of this mixture was tentatively suggestive as 88 per cent of iron and 12 per cent of sulphide of manganese. Such a composition would obviously be of relatively low specific gravity and would tend to rise through the still unfrozen main mass of steel. He suggests that as this definite substance rises in a thick, pasty or semi-frozen state, it forms in definite parts of the ingot nuclei which gather to themselves the migratory compounds of steel, namely, carbide, phosphide and in nickel steels, nickelide of iron, and the gigantic ghosts present in each octagonal angle of the "bled" ingot were formed in this way.

The movement to bring about a uniform law for the operation of steam and other boilers among the different States is progressing favorably in Indiana and campaigns are under way in Georgia, Kentucky, Louisiana, Maryland, Massachusetts, Mississippi, New Jersey, New York, Rhode Island, South Carolina and Virginia. The legal work is based on the boiler code drawn up by the American Society of Mechanical Engineers. Thomas E. Durban, chairman of the administrative council of the American Uniform Boiler-Law Society, says the code is used as a textbook in Stevens Institute of Technology, Hoboken, and is under consideration for similar use elsewhere.

Glenn R. Sawyer and John G. Simms, Elkhart, Ind., receivers for the Angdile Computing Scale Company, valued at \$450,000, have been ordered by the court to sell the plant Feb. 16.



## Pittsburgh and Nearby Districts

At the recent annual meeting of stockholders of the Brier Hill Steel Company, Youngstown, Ohio, an increase in the common stock of \$1,500,000 was authorized, making the total authorized issue \$15,000,000. The preferred stock outstanding is \$5,000,000, making the total of authorized capital \$20,000,000. In addition to the enlargement of the open-hearth steel plant and the building of a by-product coke plant the company has decided to build one or two jobbing mills to roll light plates and may build one or two other finishing mills. The directors authorized the statement that dividends at the rate of 6 per cent per annum will be paid on the common stock April 1, for the first quarter of 1916, and that dividends will be continued as long as business conditions warrant. Directors were re-elected as follows: W. A. Thomas, H. H. Stambaugh, John Stambaugh, R. C. Steese, E. L. Ford, John Tod, David Tod, J. G. Butler, Jr., and G. F. Alderdice. All the former officers were re-elected.

At the recent annual meeting of the stockholders of the Follansbee Brothers Company, Pittsburgh, the directors were re-elected as follows: B. G. Follansbee, William U. Follansbee, Nathaniel Holmes, J. D. Lyon, H. Darlington, Jr., William Banfield and W. W. Bell. The board then elected officers as follows: B. G. Follansbee, chairman; William U. Follansbee, president; William Banfield, vice-president and general manager of plant and operation; John Follansbee, vice-president and general manager of sales; George L. Follansbee, treasurer; William D. Reid, secretary and auditor; Charles A. Wilson, assistant to president; E. Masters, assistant auditor.

At the annual meeting of stockholders of the Youngstown Foundry & Machine Company, Youngstown, the board of directors was re-elected as follows: W. J. Wallis, B. G. Parker, F. A. Williams, A. E. Adams, H. J. Parrock, S. K. Hine and E. Hartzell. The company states that its business in 1915 was very prosperous.

A special meeting of stockholders of the General Fireproofing Company, Youngstown, will be held at an early date at which the question of increasing the capital stock of the company \$1,000,000 will be considered. It is proposed that the stock increase shall be half common and half preferred. The company now has a capital of \$1,000,000 equally divided between preferred and common stock.

The Fort Pitt Bridge Works, Pittsburgh, whose plant is at Canonsburg, Pa., has given a 10 per cent increase in wages to its employees other than those employed in the offices and drafting rooms.

The Shelby Steel Tube Company, Ellwood City, Pa., a subsidiary of the United States Steel Corporation, has given its employees a 10 per cent increase in wages.

The Youngstown Foundry & Machine Company and the Mahoning Foundry Company, both of Youngstown, have increased wages of molders from \$3.75 to \$4 per day.

The Goodman Engine & Machine Company, Pittsburgh, with a capital stock of \$45,000, has been re-incorporated by Joseph and Frank T. Goodman and others to manufacture engines, machinery and iron work.

The Pittsburgh Grinding Wheel Company, Pittsburgh, with a capital stock of \$5000, has been incorporated by R. T. Rossell, 1027 Carnegie building, Pittsburgh, and others to manufacture grinding wheels and safety appliances.

The Blairsville Sanitary Company, Blairsville, Pa., with a capital stock of \$100,000, has been incorporated by Frank M. Graff, E. S. Gilmore, and others to manufacture sanitary enameled ware and to operate a foundry.

The Dubois Garage, Dubois, Pa., with a capital stock of \$10,000, has been incorporated by J. C. Borland, Falls Creek; F. B. Weaver, Dubois, and others, to operate a garage and to conduct a general machine and repairing business.

The Fort Pitt Casket Company, Pittsburgh, with

a capital stock of \$10,000, has been incorporated by Ralph C. Capek, 207 Hobart Street, Pittsburgh, and others to manufacture undertakers' supplies.

The plant of the Sligo Iron & Steel Company, South Connellsville, Pa., has been sold to the Sligo Steel Company, Pittsburgh, recently incorporated with a capital of \$750,000. Equipment for the manufacture of steel railroad ties will be installed.

The annual convention of the Trussed Concrete Steel Company was held at the main plant and general sales office at Youngstown, Jan. 25 to 28. The convention was national in scope, branch managers from all sections of the country being in attendance. Fully 100 persons took part in the proceedings. The business sessions during the day were devoted to all phases of manufacturing, engineering, service and sales, covering the various Kahn building products manufactured by the company. An enjoyable program of entertainment was arranged for the evening meetings.

The third annual banquet of the Westinghouse Veterans' Association, composed of employees of the Westinghouse Electric & Mfg. Company, who have been with it 20 years or more, was held Jan. 29, in the Fort Pitt Hotel, Pittsburgh. The feature of the evening was the unveiling and presentation to the company, by the veterans, of a bronze memorial tablet of the late George Westinghouse. It is the work of Lorado Taft, and will be mounted in the reception room of the East Pittsburgh works of the company. The tablet was presented by Charles F. Scott of Yale University, and accepted on behalf of the company by Guy E. Tripp, chairman of the board of directors.

The Pittsburgh Steel Company has notified holders of its 6 per cent notes, series A, dated Jan. 1, 1915, and maturing Jan. 1, 1918, that it will anticipate payment on March 1, 1916, in cash, adding 1 per cent to the face value of the notes and accrued interest, on presentation at the Union Trust Company, Pittsburgh, trustee. This will liquidate all the unredeemed notes maturing Jan. 1, 1918. The action demonstrates the strong financial position of the company.

The Standard Scale & Supply Company, which has maintained offices and warehouse for some years at 243 Water Street, Pittsburgh, has leased for a term of years a large building at 1631 Liberty Avenue in that city, which it will remodel to meet its needs. Its offices and warehouse will then be removed to the new building.

The Wheeling Mold & Foundry Company, Wheeling, W. Va., is reported to have secured an order from the British Government for 36,000 6-in. shells. This is the third large order for shells received by the company from the Allies. It has been turning out about 1500 shells per day for some time for France and work will start this week on a large order for shells taken some time ago from Russia.

The Crescent Furniture Company, Warren, Pa., with a capital stock of \$12,500, has been incorporated by H. V. Hazeltine, 710 Pennsylvania Avenue, Warren; Charles Forsgen, and P. L. Davis, to manufacture furniture from wood and metal.

The Schoen works of the Carnegie Steel Company at McKees Rocks, Pittsburgh, is turning out about 700 forged steel car wheels per day. Additions now under way at the plant will increase the output to 1000 wheels or more per day.

## Railroad Car Business

In railroad-car buying, the main items comprise 500 underframes for the Baltimore & Ohio, placed with the Ralston Steel Car Company, and 25 ore cars for the Bethlehem Chile Iron Mines Company, placed with the Pressed Steel Car Company. The Baltimore & Ohio has entered the market for 500 refrigerator cars and the Bessemer & Lake Erie has added 500 gondolas to the 2000 hopper cars for which it is inquiring. Up to Jan. 29 the total car orders for the month are estimated at 22,737, which compares with 26,939 last October and 19,863 in November, but only 7055 in December.

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# THE IRON AGE

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## The Foreign Trade Advance

The convention at New Orleans last week signified more than any other national gathering of business men the strength and momentum of the movement for American trade extension in foreign markets. It was remarkable for the importance of the interests represented, the business power of the men who took part in it, and their purpose to push forward on definite lines. Its temper was constructive. In the discussion of export trade problems there was little of the spirit of controversy, but much of a disposition to bring out facts so as to make intelligent sentiment. One could only wish that some scores of the men who shape policies at Washington could have sat in the convention hall and had the benefit of the liberal education of those three days.

The National Foreign Trade Council, on whose invitation 500 business associations and companies small and large sent delegates to the convention, is composed of fifty members. They represent manufacturing, merchant, railroad, banking, farming and vessel interests in all sections of the country. Their work is educational and non-political, and the conventions pass no resolutions. There is no vagueness about their aims, however. As is indicated in the report of the proceedings, given elsewhere, some conclusions were reached at New Orleans. Briefly they may be expressed in some such terms as these: Investments of our capital should be made in Latin-American and other countries to increase their purchases of our products. Congress should create a permanent shipping board for the revision of all shipping laws so as to establish an American merchant marine. This country should have a non-partisan tariff commission and a bargaining tariff. The work of training young men for foreign trade should be pushed on practical lines. American manufacturers should be allowed to co-operate in selling in foreign markets.

There was no delusion on the part of the men at New Orleans as to the long road that must be traveled before this country can be considered a great factor in export trade. Yet it was plain that progress had been made since the convention at St. Louis one year ago. Under the depressed conditions surrounding that gathering few men were brave enough to say that this country must make investments in South America if it expected to get much business in that quarter. Yet there was a very strong note

of that sort at New Orleans. At St. Louis, too, one or two men known to be close to the Administration surprised their hearers by intimating that no prosecutions would be made of companies co-operating in export trade. At New Orleans the chairman of the Federal Trade Commission said plainly that the commission believed such co-operation is not forbidden by existing law, but that, if the contrary were held, it would favor changing the law so that it might be legal. It was evident at New Orleans, too, that sentiment is crystallizing on the question of merchant marine; that the conviction is growing that time will really be gained if a commission of experienced men goes thoroughly into the question and brings out the facts so clearly that the demand for action in the interest of all the people will be irresistible.

While progress in the export movement is seen, there were men at New Orleans who said plainly that our manufacturers are losing time, and that eighteen months of a war that has tied the hands of Europe's greatest exporters have passed with too little effort to take advantage of the American opportunity. Perhaps what was said on this line will prove one of the best fruits of the convention, for it will wake up all who heard it to the necessity of acting promptly. But more iron and steel manufacturers should have been there to hear. Meeting and conferring with men of capacity, long engaged in manufacturing for export, with representatives of the Department of Commerce and of well-known trading and shipping houses, was no less informing than to listen to the stated addresses from the platform. It will be a serious misfortune if the present war-order prosperity blinds our steel manufacturers to the necessity of taking steps now to hold the trade in the peaceful arts which is coming to them from outside markets.

## President Favors Tariff Commission

No canvass is necessary to obtain the views of business men regarding the proposition of President Wilson to establish a tariff commission. The announcement from the White House that the creation of such a commission is now favored is an illustration of the quick changes which are occasionally brought about by apparently irresistible developments. The formation of a tariff commission has long been favored by practically all busi-



ness interests. Time and again has this method of handling the tariff question been advocated by those who are only academically interested in it, partly for the purpose of avoiding the general disturbance of business attending the revision of the schedules and partly in the hope of securing a much more scientific system of tariff duties than can be arrived at under the usual method of procedure. The tariffs that have been made up to this time, with the exception of the act of 1884, have been the work primarily of the Ways and Means Committee of the House of Representatives, slightly assisted by men of experience in business methods, then overhauled, remodeled and sometimes completely transformed by the Finance Committee of the Senate and afterward perhaps quite extensively revised by a conference committee of the two bodies. The result has been that our schedules of tariff duties have been a composite structure in which the various parts bore no correct adjustment to one another, but too frequently abounded in incongruities and in provisions which wrought injustice either to manufacturers or to manufacturing consumers.

Renewed efforts have been made in the past year or two to secure the adoption by Congress of a measure providing for a tariff commission. This has grown from the strong desire by business men, as well as by some practical politicians, to take the tariff out of politics if possible and place future revisions in the hands of men of expert knowledge and undoubted impartiality. The movement has latterly gathered some momentum through the apparent necessity of providing for some measure of defense from accelerated exports by European belligerent countries after the war. It is quite acceptable to these people to find that President Wilson has changed his attitude from opposing a tariff commission and that in a letter sent to Representative Claude Kitchin, chairman of the Committee on Ways and Means, Jan. 24, followed by another letter Jan. 26, he admits that he has changed his mind "because all the circumstances of the world have changed" and now hopes that it will be possible for the Committee on Ways and Means to take this question up with a view of formulating some policy and action concerning it. It is true that President Wilson does not go so far as might be desired in this matter, but it is highly important to know that he favors a commission, even if it is not to recommend a full revision of the tariff schedules but is to furnish information to guide in legislative or executive action in tariff matters. Inasmuch, however, as he goes to considerable length in his letters to Mr. Kitchin to speak of the nature and causes of the advantages and disadvantages of American as compared with foreign producers "and the possibility of establishing new industries or of expanding industries already in existence through scientific and practical processes in such a manner as substantially to promote the prosperity of the United States," the possibility is apparent of the endowment of a tariff commission with greater powers than he at first contemplated. With regard to the danger of foreign manufacturers dumping their products in this country, he says that "it is clear that as soon as we know the facts we ought to deal with unfair methods of competition as between our own nation and others."

It is interesting to note that Washington advisers represent Chairman Kitchin as contending that the change among the majority leaders to the support of a tariff commission "is justified from an economic and political viewpoint by the demand of the country's business that there should be a more scientific consideration of the tariff issue and that it should cease to be a football of politics." The business men of the country will hail with much satisfaction the bill which was introduced in the House of Representatives on Tuesday to establish such a commission as now appears to be favored by the President.

### What Railroads Are Accomplishing

If the railroads are not at the present time hauling the greatest amount of freight per mile of road in their history, they are coming very close to breaking the record. The great congestion, both of loaded cars in the East and of freight awaiting shipment only serves to emphasize the importance of this fact, seeing that there has been reported, for Jan. 1, a surplus of 68,700 cars and a shortage of 21,745 cars, making a net surplus of 46,955 cars. In 1907, 1909, 1912 and 1913, with a smaller volume of traffic in most if not all instances, there were net shortages.

It has been claimed in many quarters that the railroads in recent years have not been buying as many new cars as they should, but the conditions existing to-day certainly do not confirm such a view. If there is a shortage of something, it is not a shortage of cars. The traffic managers of some of the shippers, who can hardly be classed with the "laymen" from whom railroad managers are well known to be indisposed to take advice, suggest with respect to the freight blockade in the East that there has been a lack of either brains or courage among railroad men, on the ground that the present trouble is due in major part to export material having been accepted by them when vessels were not ready to accept it. It might be suggested that it would be asking a good bit of the railroads to watch matters of that sort so closely, but in human affairs when something has to be done somebody must do it, and certainly there is no agency but the railroads that could exercise the needed foresight. It was the duty of the railroads, if only for their own interest.

That the railroads are accomplishing a great deal with their cars, when the volume of traffic is so large and many cars are blockaded, so that there is still a net surplus of cars, must be admitted. That this can be the condition when the number of cars has not been increased to the extent that some observers thought necessary seems to be due in large part to the greatly increased train loads, effected by better management and more powerful locomotives, aided greatly by an increase in the average capacity of the cars and a loading more nearly to capacity. The live load is a larger percentage of the total load than formerly. The latest official returns being for the fiscal year 1914, it may be observed that the average train loads from 1894 to that year have been as follows: 1894, 179.8 tons; 1904, 307.8 tons; 1914, 451.8 tons. These figures represent decennial gains of 71 per cent and

47 per cent, or a total gain in 20 years of 152 per cent.

This comparison does not bring the matter up to date by any means, however. A great deal more has evidently been accomplished since June 30, 1914, when the last fiscal year named above closed. Recently the *Railway Age Gazette* made a compilation of train loads on thirty-five roads the reports of which for the fiscal year 1915 were available, showing that these roads had increased their train loads 4.6 per cent from 1914 to 1915, although the increase occurred at a time when most roads experienced a decrease in total traffic. With the great increase in traffic that has occurred since the close of the fiscal year 1915 there has doubtless been a large increase in the train load.

The increase in train loads is bound to continue. Car buying by the railroads promises to be largely for the purpose of replacing the older and lighter cars with more capacious ones, cars for special purposes being added at the same time as required. In locomotives there will likewise be more of replacement of light locomotives by heavy ones than of increase in the total number in service.

#### A German Opinion on Post-Bellum Trade Conditions

Germany's trade and industry were reported to be still holding their own after nearly a year and a half of war, according to a statement by President Klöckner of the Haspe Steel Works, at its general meeting recently. He said that the demands from neutral countries for pig and bar iron were considerable, so as to insure plenty of work for the winter and that the prospects of the iron industry were still favorable. What the position would be after the war no one could say with certainty. He expected that money would be dear, which would, however, check over-speculation; that it was international as a commodity and that after the war it would find its way back from the centers where it is now accumulating to those where it could be placed with confidence.

Germany's prospects for export trade continue good, he thought. England had so far not captured any neutral markets, because the British works had no opportunity to exploit the trade war, having enough to do at home. This also seemed to apply to America if, as reported, the Steel Corporation was retiring from export business owing to the pressure of domestic orders. [A wrong deduction.—ED.] As a result of the general depletion of large stocks in all overseas markets, a demand would set in for which Germany might successfully compete after peace was restored. Her friendly relations with South America entitled her to entertain the best hopes from that quarter. The nation's industries were supplied, he said, for a long time ahead with everything necessary for prosecuting the war as well as with the commodities needed for the arts of peace.

The 150 hatters at Danbury, Conn., whose homes were threatened with foreclosure under a United States judgment in the Loewe boycotting case, have been advised that more than \$350,000 has been contributed by the union men of the country, being more than enough to save all the property. It is estimated that the fund collected will reach \$400,000. For a long time it appeared doubtful that other workmen would help the Danbury hatters out of their trouble and union leaders had much difficulty in starting such a movement.

Aluminum production in 1915 in this country is estimated by several authorities at about 80,000,000 lb., a record achievement, comparing with about 45,000,000 lb. in 1914.

#### May Purchase E. & T. Fairbanks & Co.

Fairbanks, Morse & Co., Inc., Chicago, has made an offer to E. & T. Fairbanks & Co., Inc., scale manufacturer, St. Johnsbury, Vt., having in view a consolidation of the two companies. Fairbanks, Morse & Co. is the Western selling agent of the company which it proposes to acquire. It offers to purchase all of the outstanding shares of the capital stock of E. & T. Fairbanks & Co. by the exchange of three shares of the 6 per cent cumulative preferred stock of Fairbanks, Morse & Co. for each share of the outstanding stock of E. & T. Fairbanks & Co., the exchange to be on a basis of \$300 for each share of the latter company's stock.

Fairbanks, Morse & Co. is an Illinois corporation, established in 1871, engaged in the manufacture and sale of oil engines, steam pumps and windmills, and also deals in electrical machinery, railroad motor cars and other railroad equipment manufactured for it by associated companies. Its main office is in Chicago with branch offices in several large American cities, also in London and Buenos Ayres. It has a manufacturing plant at Beloit, Wis., employing 2000 men. It is stated that if the exchange of stock be consummated the manufacture of scales and other articles at St. Johnsbury will be continued, and the output increased. The Beloit manufacturing end of the company is known as the Fairbanks-Morse Mfg. Company.

The directors and officers of E. & T. Fairbanks & Co. have approved the acceptance of the offer on the ground that the manufacturing and selling interests of their company should be brought under one management. The Eastern selling representative of E. & T. Fairbanks & Co. is the Fairbanks Company.

#### Pittsburgh & Seaboard Engineering Company

The amalgamation of three important Pennsylvania companies into the Pittsburgh & Seaboard Engineering Company, with a capital of \$4,000,000, is announced. The component units are the Robert Wetherill Company, Chester, Pa.; Riverside Engine & Machine Company, Oil City, Pa., and Kennedy-Stroh Corporation, Pittsburgh. Included among the directors are T. Coleman du Pont, Wilmington, Del.; Charles T. Schoen, Philadelphia, formerly president Schoen Steel Wheel Company, and Senator William Sproul, Chester, Pa. Mr. Sproul is to be president and Mr. Schoen, chairman of the board, with F. B. Bell, H. E. Kennedy and H. J. Klaer, vice-presidents. W. H. Schoen, Pittsburgh, will be the treasurer. Important foreign contracts for war and other supplies are reported taken by the new company but also denied. Another rumor is that one product of the new company will be steel carwheels.

#### Further Merging of Chester Steel Casting Plants

The enlargement of the Penn Marine & Ordnance Casting Company, Chester, Pa., recently formed by the consolidation of the Penn Steel Casting & Machine Company, Chester, and the Baldt Steel Company, New Castle, Del., is contemplated by the absorption of the Seaboard Steel Castings Company, Chester, of which Senator William C. Sproul is president and founder. If the merger takes place, it is stated that Mr. Sproul will become chairman of the executive committee of the Penn Marine & Ordnance Casting Company.

Ways of presenting data for executive purposes are to be discussed by T. Russell Robinson, statistical engineer for W. S. Barstow & Co., Inc., New York, at a meeting of the American Society of Mechanical Engineers, Tuesday evening, Feb. 8, at 29 West Thirty-ninth Street, New York.

The Chester Shipbuilding Company, Chester, Pa., has recently closed contracts for building five tank steamers and one freighter at a cost of \$6,000,000. With the two vessels already started, the company has eight under contract.



## ARMOR PLANT AGITATION

### Bethlehem Steel to Cease Armor Making if Government Builds Plant

WASHINGTON, D. C., Feb. 1, 1916.—Representatives of the armor-plate manufacturers to-day served notice on the Senate Committee on Naval Affairs that if the Tillman bill appropriating \$11,000,000 for a government armor factory becomes a law, they will be compelled at once to take steps for the amortization of their armor plants to close them down by the time the government begins the actual production of plate. This statement, embodied in a carefully prepared memorandum, was read to the committee by President E. G. Grace, of the Bethlehem Steel Company, and apparently was concurred in by President A. C. Dinkey and Vice-President W. P. Barba of the Midvale Steel Company, who were present. As at the two previous meetings, no representative of the Carnegie Steel Company was in attendance. Following Mr. Grace's statement, the committee held an executive session on Chairman Tillman's demand for a vote on the bill, but after a few minutes' discussion Senator Penrose secured an adjournment to Feb. 8, to give Senators an opportunity to consider carefully the position in which the government will find itself if the issue is squarely joined.

Secretary Daniels told the committee this morning that officials of the Bethlehem and Midvale companies had called on him and suggested that an expert accountant be employed by the Navy Department to ascertain by an examination of their books the exact cost of producing armor, the information to be considered as confidential so far as it disclosed manufacturing costs. The Secretary said that he had declined to adopt this suggestion, because he did not feel it would be proper for him to accept in confidence information which he regarded it as his duty to transmit to Congress.

He then read letters which he said he had received in the past week from the Midvale Company offering armor at \$402.50 per ton for 40,000 tons, or at the rate of 8000 tons per annum, for the five-year period included in the Administration's national defense program, and from the Bethlehem Company at \$395 per ton for one-third of the requirements of the five-year program, or for any amount in addition to one-third. These prices he said were subject to the abandonment of the project for a government armor factory. The Secretary said he had not accepted the propositions and intimated that his conferences with the representatives of the manufacturers had not induced him to change his mind as to the desirability of passing the Tillman bill for a government factory.

Senator Penrose reminded the Secretary that for many years it has been the policy of the Navy Department to keep the armor plate plants going in order that they might be in condition to supply very large quantities of armor on short notice in the event of an emergency. A similar policy has been followed in allotting battleships and other war vessels to the various shipyards. The hostile attitude of the Navy Department under the present Administration, Senator Penrose said, had evidently so discouraged the Carnegie Steel Company that its officers had about concluded that the manufacture of armor plate was too small a part of its business to justify spending much time in Washington.

A spirited exchange then took place between Senator Tillman and Mr. Barba of the Midvale Company. The Senator suggested that it would be well for the government to build an armor-plate plant capable of producing all the armor needed for the naval program, or at least 20,000 tons per annum, but to limit its production to about 10,000 tons by running it on an 8-hr. basis and purchasing the remainder of the required armor from private establishments. Mr. Barba promptly called Senator Tillman's attention to the fact that the manufacture of armor is practically a continuous process involving at one stage the treatment of plates throughout the 24 hours for a period of 28 days with a constantly maintained temperature of 2000 deg. With some heat Mr. Barba added: "You need a little manu-

facturing experience, Senator, to understand these problems."

Mr. Grace then read to the committee the letters of the Bethlehem Company offering to make armor at \$395 per ton under certain specified conditions. He explained that they had reduced the price of armor by \$30 a ton, and that the price had been submitted on the basis that they could expect a return of 7½ per cent, applicable to depreciation and profits. "If our company did not have its investment in the armor-plate plant," he said, "I would unhesitatingly recommend against such an investment on account of the return not being sufficient to warrant the risk." One paragraph from the statement was as follows:

"In the event of the United States Government's creating a government armor-plate plant, I realize it immediately renders useless all private plants, and just so soon as legislation is passed, authorizing the government plant, I shall immediately recommend to our stockholders and board of directors that necessary steps be taken to provide for the amortization of the investment in our plant by the time the government plant can be put in operation."

W. L. C.

### Sampling and Analyzing Flue Gases

As the analysis of flue gases tends to develop better methods of firing, which in turn reduces waste of fuel, the Bureau of Mines, Department of the Interior, in bulletin 97, "Sampling and Analyzing Flue Gases," by Henry Kreisinger, engineer, and F. K. Ovitiz, assistant chemist, just issued, presents for the benefit of those in charge of boiler plants and all other persons interested detailed information on methods of sampling and analyzing flue gases, and on the utilization of the analyses in promoting boiler-room economy.

The treatise is arranged in two parts. The first part contains the description of the apparatus and the methods used in sampling and analyzing flue gases. The second part gives experimental results obtained with the different methods of sampling and collecting flue gas that are recommended in the first part of the report. Only simple apparatus and methods are considered, as they are accurate enough to show the large heat losses due to the use of too much air, and are also accurate enough to indicate any incomplete combustion losses of economic importance.

### A Rennerfelt Electric Furnace for Pittsburgh

A Rennerfelt electric steel furnace has been sold to the Crucible Steel Company of America to be installed at one of its Pittsburgh plants. It will make alloy and special steels and operate from poly-phase currents at 60 cycles. This is the third furnace contracted for in this country. The two that are being installed at the Old Dominion Iron & Nail Works Company, Richmond, Va., are expected to be in operation late this month.

### British Manganese Ore Imports for 1915

Manganese ore imports into Great Britain in December, 1915, were 39,271 gross tons, which compare with 67,308 tons in November. The total for 1915 was 377,324 tons, against 479,435 tons in 1914. The average monthly imports in 1915 were 31,443 tons, which compare with 39,953 tons per month in 1914 and 50,098 tons in 1913.

The Union Iron Works, San Francisco, has purchased the United Engineering Works, a shipbuilding concern, with a water frontage of 1300 ft. on San Francisco Bay, a plant area of 23 acres and two marine ways capable of accommodating vessels up to 4000 tons. According to a statement of J. A. McGregor, president of the Union Iron Works, it is the intention to spend \$250,000 upon improving the plant. Three new slips are to be built and the new equipment will include \$50,000 of modern machinery and tools.

The January price for spelter in Germany was fixed by the Spelter Syndicate at 63.25 marks per 100 kg., with the usual additional charge of 25 pf. per 100 kg. for spot material.

## PERSONAL

William H. Woodin has been elected president of the American Car & Foundry Company, to succeed the late Frederick H. Eaton. Since 1902 he has been a director and assistant to the president, in which capacity he had general direction, under Mr. Eaton, of the company's affairs. Mr. Woodin learned the business of carbuilding in the Jackson & Woodin Mfg. Company, which was established by his grandfather in 1842 at Berwick, Pa., and which was one of the companies merged in the American Car & Foundry Company. He received his technical education at Columbia University School of Mines, and then worked his way through the shops. In 1899, when the American Car & Foundry Company was formed, he became district manager in charge of the Berwick works, which is the largest carbuilding plant in the country.

President James A. Farrell of the Steel Corporation went from the foreign trade convention at New Orleans to Mobile, Ala., for an inspection of its port facilities. He was accompanied by a number of delegates to the convention, including George G. Crawford, E. P. Thomas, Jay I. Andrews and A. T. DeForrest.

Charles F. Rand, president Spanish-American Iron Company, was elected president of the United Engineering Society at the annual meeting, Jan. 27, Gano Dunn declining re-election.

Forrest E. Cardullo, who was last year head of the department of mechanical engineering of the University of Texas, is now chief draftsman of the Pierce-Arrow Motor Company, Buffalo, N. Y.

B. J. Klein, who has had a long experience with the Bristol Company, including a period of more than six years as Chicago district manager, has been appointed Pacific district manager of a branch office just established by the Bristol Company at 727 Rialto Building, San Francisco. Mr. Klein was in charge of the company's exhibition of recording and indicating instruments, belt fasteners and other specialties at the Panama-Pacific Exposition.

A. A. Bostwick has been elected president of the Union Chain & Mfg. Company, Seville, Ohio. Walter Hay becomes vice-president as well as general manager. W. G. Brumbaugh is now secretary and A. S. Foster treasurer.

Albert W. Kimber, director of sales for the Fitch Publishing Company, 47 Broad Street, New York City, has been elected secretary of the Efficiency Society and has established an office for the society in the Broad Exchange Building, New York.

Theodore S. Tenney and Arthur K. Ohmes will continue in business as consulting engineers for heating, ventilation and power plant work at 101 Park Avenue, New York, under the firm name of Tenney & Ohmes. Werner Nygren, who has withdrawn from the firm of Nygren, Tenney & Ohmes, by mutual consent, is practicing independently at the same address.

John C. Davies has succeeded H. S. Endsley as solicitor of the Cambria Steel Company, Johnstown, Pa.

William H. Donner, president Cambria Steel Company, has been elected president of the Frontier Steamship and the Niagara Transit companies, which were recently acquired from the M. A. Hanna interests of Cleveland to carry ore for the Cambria Steel Company.

Charles E. Barba, assistant mechanical engineer for the Pennsylvania Railroad at Altoona, Pa., has resigned to take a position with the Midvale Steel Company.

Edward Clifford, Middletown, Pa., has gone to France in the interests of the Middletown Car Works.

Waldemar R. Kremer has been elected general sales manager of the Vilter Mfg. Company, Milwaukee, Wis., to succeed the late Fred Ulrich. Mr. Kremer has been associated with the company for ten years as

consulting electrical and mechanical engineer in the sales department. In his new capacity he will have general charge of sales and supervision of branch offices and agencies in this and foreign countries.

Arthur A. Hadden has resigned as head of the piece-work department of the P. & F. Corbin division of the American Hardware Corporation, New Britain, Conn., to accept a position as hardware manager for the John Thompson Press Company, Long Island City, New York.

Albert J. Maheu, superintendent Morgan Spring Company, Worcester, Mass., was presented with a gold watch at the third annual banquet of the employees of the company, Jan. 22.

William E. Smith has been elected secretary of the Southington Hardware Mfg. Company, Southington, Conn., to fill the vacancy caused by the resignation of J. Wilder Howe.

Herbert L. Beeler, Cincinnati, Ohio, has accepted a position as general superintendent of the Cleveland Machinery & Supply Company, Cleveland, Ohio.

W. T. Handwerk, treasurer and business manager of the Slatington Rolling Mills, Slatington, Pa., since 1912, has resigned, effective Jan. 31. The company is now practically disbanded and nothing will be done with its plant until the present owner again sells the property. Mr. Handwerk has not yet stated his plans for the future.

Clarence A. Blood, traffic assistant of the Lehigh Valley Railroad Company, after 38 years' service with the company, has asked to be relieved of his active duties. He will maintain his office at 143 Liberty Street, New York, as heretofore.

A. J. Brasseau, general manager, Gale Mfg. Company, Albion, Mich., has been chosen vice-president of the Federal Motor Truck Company, Detroit, effective Feb. 1. He will continue to devote a part of his time to the Gale Company until the close of its fiscal year, July 1.

William Bjorkstedt has become works manager of the Stavanger Electro-Staalverk in Stavanger, Norway. He was formerly with Siemens & Halske, 90 West Street, New York, giving special attention to the electric furnace department.

E. C. Collins and A. F. Harvey, who have been associated with the management of the Pittsburgh Steamship Company for a number of years, were advanced to newly created positions of vice-presidents at a recent meeting of the board of directors, continuing to discharge their former duties. Mr. Collins has been traffic manager, and as such has directed the handling of transportation of ore and coal shipped by the company. Mr. Harvey has been an assistant to President Harry Coulby in the operation of the fleet and as manager of the property.

R. E. Bebb was elected president of the Central Steel Company, Massillon, Ohio, at a meeting of the stockholders last week, succeeding John C. Neale, who recently resigned to become general manager of sales of the Midvale Steel Company and Worth Brothers Company. Mr. Bebb, who is president of the Canton Stamping & Enameling Company, has been first vice-president of the Central Steel Company, and took a most important part in organizing the company and building the plant. F. J. Griffiths, who has been second vice-president, was re-elected vice-president. C. E. Stuart was re-elected secretary and treasurer. The board of directors is composed of I. M. Taggart, C. E. Stuart, R. E. Bebb, H. M. Geiger and F. J. Griffiths.

W. E. DeWalt, connected with the vanadium department of the Homestead works of the Carnegie Steel Company at Munhall, Pa., has resigned to accept the superintendency of the new plant of Peter A. Frasse, Inc., Hartford, Conn. Mr. DeWalt was connected with the Carnegie Company for 21 years.

C. W. Leavitt & Co., 80 Church Street, New York, have been appointed the exclusive American selling agents for the Carlton Iron Company, English manufacturer of ferromanganese.



## The Cambria-Youngstown Sheet-Lackawanna Merger

Authoritative advices are that the proposed merger of the Cambria Steel Company, Youngstown Sheet & Tube Company, and Lackawanna Steel Company is likely to go through not later than Feb. 15. While the options on the common stock of the Youngstown Sheet & Tube Company at \$300 per share and on the Cambria stock at \$80 and Lackawanna stock at \$90 were allowed to expire at midnight Jan. 31, it is said by those in charge of the proposed merger that they have arranged to have most of these options extended until Feb. 15. James A. Campbell, president Youngstown Sheet & Tube Company, who has been very active in the negotiations, states that there was not enough time to put the project through before the options expired, but that it is almost certain to be completed not later than Feb. 15. Only the three companies named above are involved in the merger, but it is likely that later on one or two other interests will be taken over, as the new company proposes to have its own line of ore boats and possibly may become active in the building of steel cars and also in the manufacture of tin plate. It is understood that J. A. Campbell will be president of the new company, as this was one of the conditions under which the Youngstown Sheet & Tube Company agreed to become a party to the merger.

## Illinois Steel Improvements at Milwaukee

Plans for the expenditure of a sum approaching \$2,000,000 on the Bay View mills of the Illinois Steel Company at Milwaukee, Wis., were partly divulged at a meeting of the public land commission Jan. 20, when a request for the vacation of a strip 28 x 735 ft. in Superior Street, abutting the Steel Company's property, was recommended to be granted. With the consent of the Common Council, the strip will be transferred to the company. Richard B. Charlton, general superintendent, Bay View, advises that definite information is not yet available, but admits that important plans for improvement and enlargement are in contemplation. It is said that plans contemplate the construction of an additional blast furnace and the equipment of existing furnaces with gas-washing apparatus. The plant is now operating practically at capacity after a considerable period of uneven schedules. Installation of an electric furnace is also being considered.

## New Steel Plant at Ashland, Ky.

The Ashland Iron & Mining Company, Ashland, Ky., now operating a blast furnace, will build an open-hearth steel plant and blooming and finishing mills. The Ashland Steel Company, also at Ashland, has in some quarters been credited by rumor with this project, as it makes Bessemer steel billets, slabs, sheet bars and wire rods, but it advises that it does not intend to go into the manufacture of open-hearth steel.

## Gulf States Steel Company Coke Plant

James Bowron, president of the Gulf States Steel Company, Birmingham, Ala., announces the signing of a contract with the H. Koppers Company to build 37 Koppers by-product coke ovens at Alabama City, Ala. The work is to be finished by January, 1917. The output will supply the Gulf States Steel Company's blast furnace and the surplus gas will be used in the steel works adjoining.

Antimony ore production in the United States in 1915 is estimated by Frank L. Hess of the U. S. Geological Survey at about 5000 tons, containing 2000 tons of antimony, valued at about \$325,000,000. The largest previous domestic output was 150 tons of metal and 380 tons of ore carrying 55 per cent of antimony in 1892. The ore was exported.

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## SMALL DECREASE IN PIG IRON

## January Output 15,000 Tons Less

## Net Gain of Twelve Stacks—Daily Capacity Now 107,172 Tons

The January pig-iron output shows a slight falling off from the high figure established in December, the figure for last month being 3,188,344 gross tons, or 102,850 tons a day, as compared with 3,203,322 tons in December, or 103,333 tons a day. The loss in production was confined entirely to the steelworks furnaces, and was due to the Youngstown strike of early January. The merchant stacks, as was the case in December, showed a gain, but only a slight one. A net gain of 12 was made in the active furnaces last month and on Feb. 1, 307 coke furnaces were producing at the rate of 107,172 tons a day, as compared with a daily rate of 105,400 tons for the 295 stacks in blast one month previous.

## DAILY RATE OF PRODUCTION

The daily rate of production of coke and anthracite pig iron by months, from January, 1915, is as follows:

Daily Rate of Pig-Iron Production by Months—Gross Tons			
	Steel works	Merchant	Total
January, 1915	35,998	15,661	51,659
February	44,192	15,621	59,813
March	50,036	16,539	66,575
April	52,804	17,746	70,550
May	54,655	18,360	73,015
June	59,022	20,339	79,361
July	62,895	19,796	82,691
August	67,801	21,865	89,666
September	70,977	24,108	95,085
October	73,595	27,227	100,822
November	73,282	27,962	101,244
December	73,647	29,686	103,333
January, 1916	72,755	29,772	102,527

## OUTPUT BY DISTRICTS

The accompanying table gives the production of all coke and anthracite furnaces in January and the three months preceding:

Monthly Pig-Iron Production—Gross Tons				
	Oct. (31 days)	Nov. (30 days)	Dec. (31 days)	Jan. (31 days)
New York	195,852	186,758	193,818	199,534
New Jersey	3,703	6,022	5,169	4,471
Lehigh Valley	116,086	113,904	108,862	111,744
Schuylkill Valley	85,028	79,590	92,391	89,151
Lower Susquehanna and Lebanon Valley	56,702	54,557	60,785	66,473
Pittsburgh district	773,715	730,515	750,186	763,152
Shenango Valley	169,294	171,685	190,807	184,230
Western Pennsylvania	173,428	172,290	177,002	175,717
Maryland, Virginia and Kentucky	70,946	74,816	86,448	89,656
Wheeling district	116,763	114,798	117,202	113,989
Mahoning Valley	315,399	304,421	320,196	271,306
Central and Northern Ohio	240,979	246,826	254,542	263,090
Hocking Valley and Hanging Rock	47,648	41,548	39,310	51,338
Chicago district	450,978	433,184	459,524	455,538
Mich., Minn., Mo., Wis. and Col.	79,810	81,493	97,087	98,719
Alabama	212,733	211,127	228,697	227,465
Tennessee	16,427	13,774	21,296	22,771
Total	3,125,491	3,037,308	3,203,322	3,188,344

## PRODUCTION OF STEEL COMPANIES

Returns from all furnaces of the United States Steel Corporation and the various independent steel companies show the following totals of product month by month. Only steel-making iron is included in the figures below, together with ferromanganese and spiegeleisen. These last, while stated separately, are also included in the columns of "total production."

Production of Steel Companies—Gross Tons					
	Pig, total production			Spiegeleisen and ferromanganese	
	1914	1915	1916	1914	1915
Jan.	1,261,430	1,115,944	2,255,417	17,325	18,041
Feb.	1,329,414	1,237,380	.....	10,524	13,319
Mar.	1,704,688	1,551,082	.....	20,133	12,274
Apr.	1,635,226	1,584,111	.....	18,676	12,337
May	1,457,847	1,694,290	.....	21,504	13,440
June	1,329,623	1,770,657	.....	16,254	19,200
July	1,395,851	1,949,750	.....	16,524	17,854
Aug.	1,455,054	2,101,818	.....	11,577	27,463
Sept.	1,390,322	2,129,322	.....	13,786	23,159
Oct.	1,271,820	2,231,456	.....	17,435	23,992
Nov.	1,059,159	2,198,459	.....	21,977	28,741
Dec.	1,034,802	2,283,047	.....	20,733	25,004

## CAPACITY IN BLAST FEB. 1 AND JAN. 1

The following table shows the daily capacity in gross tons of furnaces in blast Feb. 1 and Jan. 1 by districts:

Coke and Anthracite Furnaces in Blast					
Location of furnaces	Total number of stacks in blast	Feb. 1 Number	Feb. 1 Capacity per day	Jan. 1 Number	Jan. 1 Capacity per day
New York:					
Buffalo	19	17	6,100	15	5,622
Other New York	5	3	637	3	634
New Jersey	7	0	0	1	167
Pennsylvania:					
Lehigh Valley	20	13	3,385	13	3,376
Spiegel	2	2	223	2	214
Schuylkill Val.	14	10	2,912	10	2,922
Lower Susquehanna	7	5	1,333	5	1,368
Lebanon Valley	10	5	776	5	775
Pittsburgh Dist.	52	51	24,656	49	23,830
Ferro	4	3	355	3	369
Shenango Val.	19	19	6,484	17	5,821
Western Pa.	22	17	5,571	16	5,579
Ferro	4	3	235	2	121
Maryland	4	3	1,251	3	1,265
Wheeling Dist.	13	11	4,077	10	3,781
Ohio:					
Mahoning Val.	25	24	10,940	23	10,685
Central and Northern	23	22	8,687	22	8,711
Hocking Val. & Hanging Rock	15	11	1,656	11	1,482
Ill. and Ind.	36	31	14,695	31	15,927
Michigan, Wis. & Minn.	11	9	2,428	9	2,366
Colo. & Mo.	7	2	757	2	766
The South:					
Virginia	24	9	1,172	7	967
Kentucky	5	3	499	3	556
Alabama	45	25	7,538	25	7,268
Ferro	1	1	70	1	93
Tennessee	20	8	735	7	722
Total	414	307	107,172	295	105,400

## DIAGRAM OF PIG-IRON PRODUCTION AND PRICES

The fluctuations in pig-iron production from January, 1908, to the present time are shown in the accompanying chart. The figures represented by the heavy lines are those of daily average production, by months, of coke and anthracite iron. The two other curves on the chart represent monthly average prices of Southern No. 2 foundry pig iron at Cincinnati and of local No. 2 foundry iron at furnace at Chicago. They are based on the weekly market quotations of THE IRON AGE. The figures for daily average production, beginning January, 1909, are as follows:

Daily Average Production of Coke and Anthracite Pig Iron in the United States by Months Since Jan. 1, 1909—Gross Tons												
	1909	1910	1911	1912	1913	1914	1915	1916				
Jan.	57,975	84,148	56,752	66,384	90,172	60,808	51,659	102,850				
Feb.	60,976	85,616	64,090	72,442	92,369	67,453	59,813	.....				
Mar.	59,232	84,459	70,036	77,591	89,147	75,738	66,575	.....				
Apr.	57,962	82,792	68,836	79,181	91,759	75,665	70,550	.....				
May	60,753	77,102	61,079	81,051	91,039	67,506	73,015	.....				
June	64,656	75,516	59,585	81,358	87,619	63,916	79,361	.....				
July	67,793	69,305	57,841	77,738	82,601	63,150	82,691	.....				
Aug.	72,546	67,963	62,150	81,046	82,057	64,363	89,666	.....				
Sept.	79,507	68,476	65,903	82,128	83,531	62,753	95,085	.....				
Oct.	83,856	67,520	67,811	86,722	82,133	57,361	100,822	.....				
Nov.	84,917	63,659	66,648	87,697	74,453	50,611	101,244	.....				
Dec.	85,022	57,349	65,912	89,766	63,987	48,896	103,333	.....				

## THE RECORD OF PRODUCTION

Production of Coke and Anthracite Pig Iron in the United States by Months Since Jan. 1, 1912—Gross Tons					
	1912	1913	1914	1915	1916
Jan.	2,057,911	2,795,331	1,885,054	1,601,421	2,188,344
Feb.	2,100,815	2,586,337	1,888,670	1,674,771	.....
Mar.	2,405,318	2,763,563	2,347,867	2,063,834	.....
Apr.	2,375,436	2,752,761	2,269,655	2,116,494	.....
May	2,512,582	2,822,217	2,092,686	2,263,470	.....
June	2,440,745	2,628,565	1,917,783	2,380,827	.....
July	2,410,889	2,560,646	1,957,645	2,563,420	.....
Aug.	2,512,431	2,545,763	1,995,261	2,779,647	.....
Sept.	2,463,839	2,505,927	1,882,577	2,852,561	.....
Oct.	2,689,933	2,546,261	1,778,186	3,125,491	.....
Nov.	2,630,854	2,233,123	1,518,316	3,037,308	.....
Dec.	2,782,737	1,983,607	1,515,752	3,203,322	.....
Total	29,383,490	30,724,101	23,049,752	29,662,566	.....

The furnaces blown out last month were Oxford in New Jersey and one Pioneer in Alabama.

Furnaces blown in in January include Harriet X (Wickwire) and the stack of the Donner Steel Company in the Buffalo district, Edith and Neville Island in the Pittsburgh district, Alice and Sharon in the Shenango Valley, Emporium and Marshall in western Pennsylvania, Covington and Dora in Virginia, one Bellaire stack in the Wheeling district, McKeefrey in the Mahoning



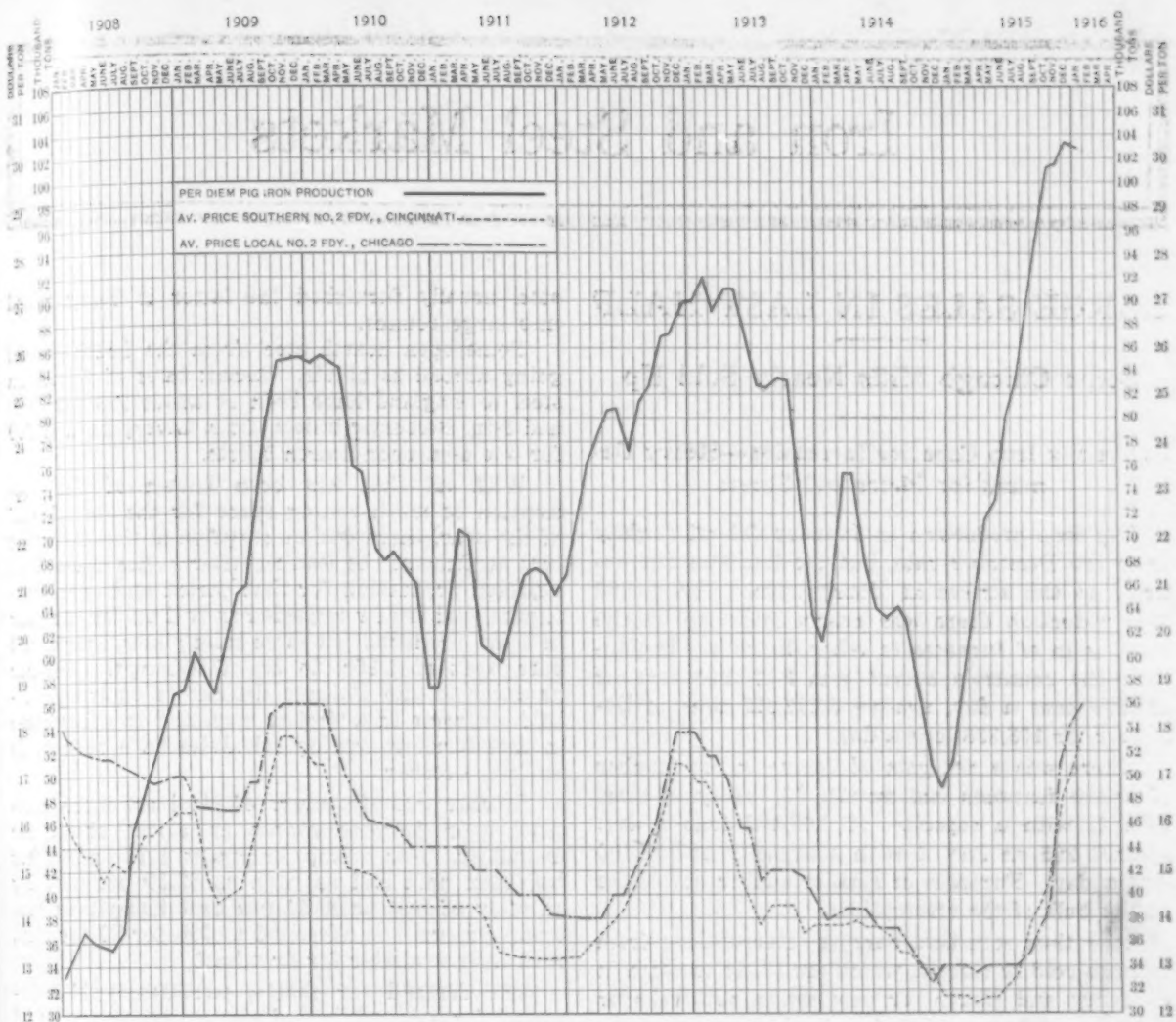


Diagram of Daily Average Production by Months of Coke and Anthracite Pig Iron in the United States from Jan. 1, 1908, to Feb. 1, 1916; Also of Monthly Average Prices of Southern No. 2 Foundry Iron at Cincinnati and Local No. 2, Foundry Iron at Chicago District Furnace

ing Valley, Alabama City in Alabama and La Follette in Tennessee.

A powdered coal system for supplying fuel for heating furnaces, for example, has been patented by Walter L. Caven, 929 Hawthorne Avenue, Cincinnati, Ohio. The powdered coal is blown through a fuel pipe extending around the plant and returning to a dust separator above the powdered coal bin, and a branch goes to each furnace. A secondary air supply for combustion, under the action of a blower, is provided with connections to each furnace and also branch connections to the fuel pipe, the last to keep up the volume of air in the fuel pipe at every point where a branch connection to a furnace is in operation.

The Wagner Electric Mfg. Company, St. Louis, has opened a new office in the Mills Building, El Paso, Tex., with F. B. Hitchings as manager. This new office is under the supervision of O. H. Davidson, district manager of the Wagner Company, whose headquarters are in Denver.

Corrigan, McKinney & Co., Cleveland, Ohio, have issued their ore book for 1916, containing analyses of Lake Superior ores for last year. Two new ores are listed, the Kimberly and Odgers, both Menominee district non-Bessemer ores, the former a brown hematite and the latter a red hematite ore.

The New York offices of the Worth Brothers Company has been moved to the nineteenth floor of 50 Church Street, where they now adjoin the offices of the Midvale Steel Company.

### Blast Furnace Notes

Ferrophosphorus is now being made at Standard furnace, Goodrich, Tenn., the furnace being under lease to J. J. Gray, Jr., who also operates Rockdale furnace, Rockdale, Tenn., on the same product.

One of the Wickwire furnaces at Buffalo, which had been out for repairs, resumed last month and both are now in blast.

Alice furnace of the Tennessee Coal, Iron & Railroad Company at Birmingham, Ala., which in its earlier career rarely made 200 tons a day, has latterly, without any particular changes in construction, but rather as the result of the better preparation of raw materials, which has marked the company's practice, come into the 325 to 350-ton class. In December and January the daily average output was 337 tons.

Alice furnace of the Valley Mold & Iron Company, Sharpsville, Pa., blown out Dec. 11, on account of an accident, was put in blast on Monday, Jan. 31, on basic iron and will turn out about 300 tons per day. The furnace was almost completely rebuilt in about seven weeks, which is a remarkable record. The work was done by the William B. Pollock Company, Youngstown, Ohio.

Due to an explosion one of the Pioneer furnaces at Thomas, Ala., was put out of blast Jan. 23. It is expected to resume early in February.

Many Pennsylvania corporations are taking advantage of the exemption clause in the new workmen's compensation act effective Jan. 1. They are permitted to carry their own insurance on application to the State Workmen's Insurance Board.

# Iron and Steel Markets

## LARGE SALES IN LAST HALF

### Some Chicago Mills Nearly Sold Up

#### Active Pig Iron Capacity Increasing—Heavy Demand for Plates and Sheets

Pig iron production in January fell off slightly from the December rate, but the loss was due entirely to the strikes at Youngstown. The 45,000 tons reduction there was nearly made up by the blowing in of furnaces in other districts. In January the country's output was 3,188,344 tons or 102,850 tons a day, against 3,203,322 tons in December, or 103,333 tons a day.

There was a net gain of twelve in the number of active furnaces last month, 307 being in blast Feb. 1, with a capacity of 107,172 tons a day, against 295 on Jan. 1 with a capacity of 105,400 tons a day. Furnaces of smaller caliber now make up the bulk of the resumptions.

It is thus seen that barring interruptions from extreme cold or storms, which are likely to come in February and March, or new strike outbreaks or embargoes, there is ahead a further moderate increase in pig iron production. In foundry iron as well as in the merchant trade in steel-making iron there are signs also of increasing consumption. The spring months will show how the balance will be struck between the two as regards prices. If another buying movement sets in of which some signs appear, there may be further stiffening. For three weeks pig iron prices have gone substantially unchanged.

At Detroit a large automobile company has bought 50,000 tons of Northern foundry iron, chiefly for the last half of the year. At Cleveland there have been sales of 5000 and 10,000 tons. In the East buying generally has been light, but 50,000 tons of basic is pending in eastern Pennsylvania.

The embargoes on iron and steel intended for New England that were released ten days ago are on again. The Pennsylvania Railroad's new restrictions at Pittsburgh apply to iron and steel to be moved east of Trenton for lighterage and to all such shipments into New England. Manufacturers are resigning themselves to the probability of intermittent embargoes, particularly in the East, over a period of months.

The acute shortage in semi-finished steel is little affected by the new steel capacity recently started. At Duluth severe weather has cut down expected output. At Cleveland the new open hearth production is limited and will be absorbed locally. An illustration of the remarkable conditions created by war demand is the shipment of billets from Joliet, Ill., to Ensley, Ala., to supply wire mills, while the

steel usually furnished the latter is being rolled into large rounds.

Some open hearth steel from the South is still going abroad as billets. Recent sales of American steel to England have been at about \$55 for 2-in. and 3-in. Bessemer billets, f.o.b. Liverpool, and \$60 for 4 x 4-in. open-hearth billets.

With all that has been known of the pre-emption of much rolling space for the second half of the year, there will be surprise at the statement that at Chicago the leading interest has allotted its expected production for that period among its customers, and is now regarded as sold up for the year in heavy products. In these sales plates, shapes and bars went at 1.90c. to 2c., Pittsburgh. Another producer in the Chicago district is entering last-half contracts in a similar way, and in other cases in that territory rolling schedules have been made up into October.

Smaller manufacturers of steel are more exercised over ferromanganese as stocks ahead are dwindling. For prompt shipment \$175 and higher has been paid and as high as \$2.50 per unit for an alloy of less than 80 per cent manganese content. Spiegel has advanced to \$35 for 20 per cent, with little available for first half.

The demand for sheets, particularly blue annealed for automobile and electric uses and for oil and other steel barrels, is enormous. Users have been urgent in getting on the books of the mills for the second half, with the understanding that prices be fixed later.

Tin-plate mills are well sold for four or five months, and \$4 has been obtained on export as well as domestic sales.

In plates prices continue to advance, and some mills are now able to offer only limited amounts for the third and fourth quarters. The shipyard demand is unending. Lake yards are about to take on seven additional Norwegian boats that will require over 8000 tons of plates.

## Pittsburgh

PITTSBURGH, PA., Feb. 1, 1916.

The Pennsylvania Railroad has again declared an embargo on articles of iron and steel for shipment east of Trenton for lighterage, and also an embargo on all shipments of iron and steel products into New England territory. The Boston & Albany will receive iron and steel freight for delivery in New England and for export under certain restrictions. While general conditions in the steel trade are quiet, prices are very strong and seem likely to go higher. On plates, shapes and bars none of the mills will promise deliveries inside of four or five months, and 2.60c., Pittsburgh, on higher is quoted on plates for June delivery. The tin-plate mills are crowded with orders for five or six months ahead, and it is expected that by March 1, or before, the price will be put at \$4 per box. Pig iron and semi-finished steel are quiet, with prices on basic iron a little easier. Coke and scrap are inactive and prices on the latter are softer. A run on a leading



## A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous.

Pig Iron, Per Gross Ton:	Feb. 2, 1916.	Jan. 26, 1916.	Jan. 5, 1916.	Feb. 3, 1915.
No. 2 X, Philadelphia...	\$20.00	\$20.00	\$19.75	\$14.25
No. 2, Valley furnace...	18.50	18.50	18.50	13.00
No. 2, Southern, Cin'ti...	17.90	17.90	17.90	12.40
No. 2, Birmingham, Ala...	15.00	15.00	15.00	9.50
No. 2, furnace, Chicago*	18.50	18.50	18.50	13.00
Basic, de'd, eastern Pa...	19.50	19.50	19.50	13.50
Basic, Valley furnace...	17.75	17.75	18.00	12.50
Bessemer, Pittsburgh...	21.45	21.45	21.95	14.55
Malleable Bess., Ch'go*	19.00	19.00	19.00	13.00
Gray forge, Pittsburgh...	18.45	18.45	18.45	13.45
L. S. charcoal, Chicago...	19.45	19.45	19.25	15.75

Billets, etc., Per Gross Ton:	Feb. 2, 1916.	Jan. 26, 1916.	Jan. 5, 1916.	Feb. 3, 1915.
Bess. billets, Pittsburgh...	\$33.00	32.00	32.00	19.50
O.-h. billets, Pittsburgh...	34.00	33.00	33.00	19.50
O.-h. sheet bars, P'gh...	35.00	35.00	35.00	20.50
Forging billets, base, P'gh...	55.00	55.00	55.00	24.00
O.-h. billets, Phila...	42.00	42.00	40.00	21.40
Wire rods, Pittsburgh...	45.00	45.00	40.00	25.00

Finished Iron and Steel, Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Bess. rails, heavy, at mill	1.25	1.25	1.25	1.25
Iron bars, Philadelphia...	2.409	2.259	2.159	1.20
Iron bars, Pittsburgh...	2.15	2.00	1.95	1.10
Iron bars, Chicago...	1.90	1.90	1.75	1.00
Steel bars, Pittsburgh...	2.25	2.10	2.00	1.10
Steel bars, New York...	2.419	2.269	2.169	1.26
Tank plates, Pittsburgh...	2.50	2.25	2.25	1.10
Tank plates, New York...	2.069	2.519	2.419	1.26
Beams, etc., Pittsburgh...	2.00	1.90	1.90	1.10
Beams, etc., New York...	2.119	2.069	2.069	1.26
Skelp, grooved steel, P'gh	1.90	1.90	1.80	1.10
Skelp, sheared steel, P'gh	2.00	2.00	1.90	1.15
Steel hoops, Pittsburgh...	2.10	2.00	2.00	1.20

\*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Sheets, Nails and Wire, Per Lb. to Large Buyers:	Feb. 2, 1916.	Jan. 26, 1916.	Jan. 5, 1916.	Feb. 3, 1915.
Sheets, black, No. 28, P'gh.	2.60	2.60	2.60	1.80
Galv. sheets, No. 28, P'gh.	4.75	4.75	4.75	3.00
Wire nails, Pittsburgh...	2.20	2.20	2.10	1.55
Cut nails, Pittsburgh...	2.10	2.10	2.00	1.50
Fence wire, base, P'gh...	2.05	2.05	1.95	1.35
Barb wire, galv., P'gh...	3.05	3.05	2.95	1.95

Old Material, Per Gross Ton:	Feb. 2, 1916.	Jan. 26, 1916.	Jan. 5, 1916.	Feb. 3, 1915.
Iron rails, Chicago...	17.50	17.50	17.50	11.50
Iron rails, Philadelphia...	19.50	19.50	19.50	13.00
Carwheels, Chicago...	14.25	14.25	14.75	10.00
Carwheels, Philadelphia...	16.50	16.50	16.00	10.50
Heavy steel scrap, P'gh...	17.25	17.50	17.50	11.50
Heavy steel scrap, Phila...	16.50	16.50	16.00	10.00
Heavy steel scrap, Ch'go...	14.75	15.25	16.00	9.25
No. 1 cast, Pittsburgh...	15.75	15.75	15.25	11.25
No. 1 cast, Philadelphia...	17.00	17.00	17.00	12.00
No. 1 cast, Ch'go (net ton)	13.00	13.00	13.75	9.00

Coke, Connellsville, Per Net Ton at Oven:	Feb. 2, 1916.	Jan. 26, 1916.	Jan. 5, 1916.	Feb. 3, 1915.
Furnace coke, prompt...	\$2.75	\$3.00	\$3.25	\$1.50
Furnace coke, future...	2.50	2.50	2.50	1.85
Foundry coke, prompt...	3.50	3.50	3.50	2.00
Foundry coke, future...	3.25	3.25	3.25	2.15

Metals, Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York...	25.50	25.50	22.87 1/2	15.00
Electrolytic copper, N. Y.	25.37 1/2	25.37 1/2	22.87 1/2	14.75
Spelter, St. Louis...	18.25	19.00	17.25	7.85
Spelter, New York...	18.50	19.25	17.50	8.00
Lead, St. Louis...	6.00	6.00	5.40	3.62 1/2
Lead, New York...	6.10	6.10	5.50	3.80
Tin, New York...	42.12 1/2	42.12 1/2	45.00	37.80
Antimony, Asiatic, N. Y.	42.50	42.00	41.00	17.00
Tin plate, 100-lb. box, P'gh.	\$3.75	\$3.75	\$3.75	\$3.10

local savings bank has been disquieting, but the Pittsburgh Clearing House Committee has issued a statement, claiming the bank is entirely solvent, and it is expected to get through its trouble in good shape.

**Pig Iron.**—Practically no new demand is observed for basic and foundry iron. The molders' strike in the Pittsburgh foundries is still unsettled, and this is restricting the consumption of foundry iron. Heavy inquiries are in the market for Bessemer iron for shipment to Italy and France, but local sellers say that, while they could get \$21 or better, there is no use in taking export orders as the railroads would not receive the iron, bottoms being practically unobtainable. The top of the market on basic iron is \$17.75, but on a firm offer probably \$17.50 could be done. Foundry iron is also slightly weaker, and \$18.50 at Valley furnace could likely be shaded. We quote standard Bessemer iron at \$20.50 to \$21; basic, \$17.75; malleable Bessemer, \$17.50; gray forge, \$17.50, and No. 2 foundry, \$18.50, all at Valley furnace, the freight rate for delivery in the Cleveland and Pittsburgh districts being 95c. per ton.

**Billets and Sheet Bars.**—As indicating the acute shortage that still exists in the supply of Bessemer and open-hearth billets, we can note a sale of 1500 tons of Bessemer billets for February and March shipment at \$37 at maker's mill. The steel mills are as far back in deliveries as ever, but some of the Valley works will soon have more open-hearth capacity available. Nearly all consumers are covered by longtime sliding scale contracts on both billets and sheet bars, so that there is not much new buying. We quote Bessemer billets and sheet bars at \$33 and open-hearth billets and sheet bars at \$34 to \$35, maker's mill, Pittsburgh or Youngstown district. We quote forging billets at \$55 to \$56, for sizes up to but not including 10 x 10 in., and for carbons up to 0.25, the regular extras being charged for larger sizes and higher carbons. Forging billets running above 0.25 and up to 0.60 carbon take \$1 per ton extra.

**Ferroalloys.**—Much uneasiness prevails among the steel mills over their supply of ferromanganese, some large consumers, that ordinarily carry four to six months' supply in stock, stating they have very little ahead. English 80 per cent is still nominally quoted at \$125, seaboard, with no guarantees as to deliveries, but

prompt English and domestic from stock are held at \$140 to \$150 per ton. Sales of two or three cars of domestic 80 per cent are reported at about \$140 at maker's furnace. We quote 50 per cent ferrosilicon for delivery through all of 1916 as follows: Up to 100 tons, \$85; over 100 tons and up to 600 tons, \$84, and over 600 tons, \$83; all per gross ton, delivered in the Pittsburgh district.

**Plates.**—One leading maker of plates states that it has practically its entire output sold up for the whole year, and is quoting only to a few customers for third and fourth quarter delivery. On a recent inquiry for 100 tons of 1/4-in. sheared plates, the best price the customer could get was 2.60c. at maker's mill for June shipment. Some fair-sized car orders were placed the past week. The Baltimore & Ohio ordered 2000 steel hopper cars from the Cambria Steel Company and 1000 from the American Car & Foundry Company. The Pennsylvania Railroad has placed orders for 1350 steel cars with its Altoona shops to be used by the Lines West. The Lehigh Valley is in the market for 1000 cars, and the Big Four has placed 15 70-ft. steel cars with the Barney & Smith Car Company. Plates are probably the scarcest item in the whole list, and it is said that close to 3c. has been paid on small lots for prompt shipment. We quote 1/4-in. and heavier plates at 2c. for shipment in third and fourth quarter, and 2.50c. to 2.60c. or higher for delivery six to eight weeks from date of order.

**Structural Material.**—Inquiry is active, but local fabricators are not taking much new business as they are filled up on all they can turn out for four or five months. The Independent Bridge Company has taken 300 tons for dam No. 14 in the Ohio River, and a local interest is reported to have taken 3000 tons for steel buildings for a new open-hearth steel plant to be built by the Ashland Iron & Mining Company, Ashland, Ky. The nominal price of shapes is 1.90c. for delivery in third and fourth quarter, but for shipment in four to six weeks from date of order, 2c. and up to 2.25c. are quoted.

**Steel Rails.**—The three rail mills of the Carnegie Steel Company at Bessemer, Pa., have rolling schedules that will take practically their entire output through third quarter. The company has lately received some large orders for standard sections and light rails

for export. The domestic demand for light rails is active. The Carnegie Company received new orders and specifications the past week for over 4000 tons. We quote light rails as follows: 25 to 45 lb. sections, 1.70c.; 16 and 20 lb., 1.75c.; 12 and 14 lb., 1.80c.; 8 and 10 lb., 1.85c., in carload lots. An advance of 5c. per 100 lb. is charged for less than carloads and down to three tons, while under three tons, an additional 5c. is charged. We quote standard section rails of Bessemer stock at 1.25c. and of open-hearth steel, 1.34c., Pittsburgh.

**Sheets.**—The demand for blue annealed and electrical sheets continues abnormally heavy and most mills have their output sold up to July or longer. Consumers are still importuning the mills to take orders for sheets for second half delivery, but so far little has been done. Specifications for sheets from the automobile builders and electrical concerns are large and the mills are back in deliveries 8 to 10 weeks or longer. Practically all the sheet mills are running to about 100 per cent of capacity and will continue to do so for months. For delivery in first and second quarters we quote: Nos. 9 and 10 blue annealed sheets at 2.65c. to 2.75c.; No. 28 Bessemer black, 2.60c.; No. 28 galvanized, 4.75c. to 5c. We quote Nos. 22 and 24 black plate, tin mill sizes, H. R. and A., at 2.30c. to 2.40c.; Nos. 25, 26 and 27, 2.35c.; No. 28, 2.40c.; No. 29, 2.45c., and No. 30, 2.50c. These prices are for carload and larger lots, f.o.b. maker's mill.

**Tin Plate.**—Specifications from the can makers and meat packers are unusually heavy, and the local tin-plate mills report they have orders on their books that will take all the material they can turn out in the next four or five months. For prompt shipment odd sizes of primes have sold at \$4 and wasters \$3.75 per base box. The bulk of the contract business was placed at \$3.50 to \$3.60, but part of it at \$3.75 per base box. Any consumers that are not covered may have to pay close to \$4 in the near future, as it is believed that before this month is out the mills will put the base price at \$4 and will adhere to it. Several large shipments of tin plate have recently been made to England, South America, India and Australia, but the recent embargo of the Pennsylvania Railroad will again cut off foreign shipments until it is removed. We quote 14 x 20 coke plates at \$3.75 to \$4 per base box, and 200-lb. base, common ternes, 8-lb. coating, at \$6.90 to \$7 per box.

**Railroad Spikes.**—Some unevenness prevails in prices of railroad spikes among jobbers, who have fairly large stocks bought when prices were lower than they are now, and which they are anxious to move, and are offering them at about 10c. per keg less than mill prices. Makers say they will not cut the price, and if they cannot secure the business offering they will close their spike machines and divert the steel to other products on which there is a larger profit. Specifications against contracts from the railroads are only fairly active. We quote:

Standard railroad spikes,  $4\frac{1}{2}$  x  $9\frac{1}{16}$  in. and larger, \$2.25; railroad spikes,  $\frac{1}{2}$  and  $7\frac{1}{16}$  in., \$2.35 base; railroad spikes,  $\frac{3}{4}$  in. and  $5\frac{1}{16}$  in., \$2.50 base; boat spikes, \$2.35 base, all per 100 lb., f.o.b. Pittsburgh.

**Skelp.**—The demand is heavy and mills report they are sold up on about all they can turn out through the second quarter. Prices are very strong. We quote: Grooved steel skelp, 1.90c. to 1.95c.; sheared steel skelp, 2c. to 2.05c.; grooved iron skelp, 2.30c. to 2.35c., and sheared iron skelp, 2.40c. to 2.45c., all delivered to consumers' mills in the Pittsburgh district.

**Wire Rods.**—The famine in rods has not been relieved. They can hardly be obtained at any price. On contracts from regular customers for delivery in second and third quarter, the mills would likely name about \$45 for Bessemer or open-hearth rods, but for prompt delivery there would be no trouble in getting \$50 or higher. The export demand is active, but the mills here are not able to take on much of this business. We quote Bessemer, open-hearth and chain rods at nominally \$45 at mill to regular customers for second and third quarter, and \$50 to \$55 for delivery in four to six weeks, with the probability that the rods could not be obtained even at these high prices.

**Wire Products.**—Local makers of wire and wire nails

are out of the market, as their output is sold up for four or five months. There is a shortage in supply of both wire nails and wire, and heavy premiums are offered for fairly prompt shipment. The demand for wire products has never been so heavy in the history of the trade as it has been for some months. Prices quoted to the large trade, on which shipments probably could not be made inside of four or five months, are as follows: Wire nails, \$2.20; galvanized, 1 in. and longer, taking an advance over this price of \$2, and shorter than 1 in., \$2.50; plain annealed wire, \$2.05; galvanized barb wire and fence staples, \$3.05; painted barb wire, \$2.35; polished fence staples, \$2.35; cement coated nails, \$2 base, all f.o.b. Pittsburgh, with freight added to point of delivery, terms 60 days, net, less 2 per cent off for cash in 10 days. Discounts on woven wire fencing are three points lower and are now quoted at  $64\frac{1}{2}$  per cent off list for carload lots;  $63\frac{1}{2}$  per cent for 1000-rod lots and  $62\frac{1}{2}$  per cent for small lots, f.o.b. Pittsburgh.

**Hoops and Bands.**—The Carnegie Steel Company has advanced its price on steel hoops to 2.10c., and other makers are also quoting this price or even higher for fairly prompt shipment. Specifications against contracts for both hoops and bands are exceptionally heavy and the mills are back in deliveries 8 to 10 weeks or longer. It is said customers are not getting over 50 per cent, if that much, of their actual needs. We quote steel hoops at 2.10c. to 2.20c., and steel bands at 1.90c. to 2c., with extras on the latter as per the steel bar card, and for such deliveries as the mills can make in their present congested condition.

**Shafting.**—No abatement is seen in the heavy demand which has existed for shafting for some months, the mills being sold up to July or longer. The nominal price of cold rolled shafting is 45 per cent off in carloads and 40 per cent in less than carloads, f.o.b. Pittsburgh. Specifications are running much beyond the capacity of the makers to supply their customers with needed material.

**Iron and Steel Bars.**—Heavy sales of steel bars for delivery in third and fourth quarter have been made by one interest at 1.90c., and also at 2c. in some cases, while for delivery this side of July prices range from 2.25c. to 2.50c. or higher. Local makers of steel bars say they are unable to do anything with the heavy export inquiries that come into this market, as their output is sold for four or five months. Prices on iron bars have again been advanced and bar-iron mills are sold up for several months. We quote steel bars at 1.90c. to 2c. for delivery in third and fourth quarters, 2.25c. to 2.50c. for shipment between now and July, and 2.40c. to 2.50c. for delivery from warehouse. We quote refined iron bars at 2.15c. to 2.20c., and railroad test bars, 2.25c. to 2.30c., f.o.b. mill, Pittsburgh.

**Merchant Steel.**—The new demand is much beyond the capacity of the mills to furnish as fast as needed, and they are back in deliveries 10 to 12 weeks or longer. For shipment in three or four weeks from date of order, premiums of \$3 to \$5 per ton are offered. On small lots for future delivery we quote: Iron finished tire,  $\frac{1}{2}$  x  $1\frac{1}{2}$  in. and larger, 2.05c., base; under  $\frac{1}{2}$  x  $1\frac{1}{2}$  in., 2.20c., planished tire, 2.25c.; channel tire,  $\frac{3}{4}$  to  $\frac{1}{2}$  and 1 in., 2.55c. to 2.65c.; 1 x  $\frac{1}{2}$  in. and larger, 2.95c.; toe calk, 2.65c. to 2.75c., base; flat sleigh shoe, 2.40c.; concave and convex, 2.45c.; cutter shoe, tapered or bent, 2.95c. to 3.05c.; spring steel, 2.65c. to 2.75c.; machinery steel, smooth finish, 2.45c.

**Nuts and Bolts.**—All makers have advanced prices about 10 per cent. Both the foreign and domestic demand continue very heavy. Makers are much behind in deliveries. Discounts now in effect are as follows:

Carriage bolts, small, rolled thread, 70 per cent off; cut thread, 65 and 10; large, 60 and 5. Machine bolts with h.p. nuts, small, rolled thread, 70 and 5; cut thread, 70; large, 60 and 10. Machine bolts with c.p.c. and t. nuts, small, 65 and 5; large, 60. Bolt ends with h.p. nuts, 60 and 10; with c.p. nuts, 60. Blank bolts, 60 and 10. Lag screws (cone or gimlet point), 70 and 10. Rough stud bolts, 50. Forged set screws and tap bolts, 35. H.p. sq. nuts, tapped or blank, \$4 off list; h.p. hex., \$4.20; c.p.c. and t. sq. nuts, tapped or blank, \$3.75; c.p.c. and t. hex., \$4.75. Semi-finished hex. nuts, 75 and 10. Finished and case hardened nuts, 75. Rivets,  $7\frac{1}{16}$  in. diameter and smaller, 70 and 10. These prices are delivered in lots of 300 lb. or more where the actual freight rate does not exceed 20c. per 100 lb.



**Carwheels.**—One local maker of steel carwheels reports that practically its entire output is sold for the greater part of this year. We quote 33-in. freight carwheels in lots of 1000 or more at \$18; 33-in. tender wheels, \$21; 36-in. passenger or tender wheels, \$25. These prices are based on a 10-in. diameter hub, 50c. extra being charged for 11-in., all f.o.b. Pittsburgh.

**Rivets.**—Local makers have again had export shipments shut off and will be able temporarily to divert their entire product to domestic consumers. The foreign and domestic demand continues heavy, and with the constant advances in prices of steel bars rivets are likely to be higher in the near future. Makers say they are getting poor deliveries on steel from the mills and this is interfering with their output of rivets. We quote button-head structural rivets, ½ in. and larger, at \$2.60, and cone-head boiler rivets at \$2.70 per 100 lb., in carload lots, f.o.b., Pittsburgh, smaller lots bringing about 10c. advance.

**Cold-Rolled Strip Steel.**—Sales are being made at premiums for such material as makers can spare. We quote cold-rolled strip steel, 1½ in. and wider, under 0.20 carbon, sheared or natural mill edge, per 100 lb., at \$4, but up to \$4.50 has been paid for reasonably prompt shipment. Standard extras, named by all the makers, are as follows:

0.10 to 0.19 Carbon—1½ In. and Wider		Lengths 24 In. and Over	
Coils		Hard	Soft
Base	\$0.25	100 and heavier	\$0.10
\$0.05	0.30	0.050 to 0.099	\$0.35
0.20	0.45	0.035 to 0.049	0.20
0.25	0.75	0.031 to 0.034	0.45
0.45	0.85	0.025 to 0.030	0.60
0.55	0.95	0.020 to 0.024	0.85
1.25	1.35	0.017 to 0.019	1.05
1.75	1.75	0.015 to 0.016	1.25
2.45	2.45	0.013 to 0.014	1.45
2.80	2.80	0.012	2.45
3.15	3.15	0.011	2.85
3.50	3.50	0.010	3.70
			4.30
			4.65
			5.00

Extras for soft apply for all intermediate tempers.

**Wrought Pipe.**—The new demand for wrought-iron and steel pipe is heavy and nearly all the mills are operating to 100 per cent capacity. The recent advances in prices are firmly held. The discounts will be found on another page of this issue.

**Boiler Tubes.**—Mills are operating to full capacity and are back in deliveries from six to eight weeks or longer, while the demand for locomotive and merchant tubes continues heavy. Makers of seamless tubes have their output sold up for five or six months. Discounts on iron and steel tubes are given on another page.

**Old Material.**—Consumers of scrap evidently being covered for the present, the demand is quiet. Prices on heavy steel scrap are slightly lower. It is expected that consumers will come in the market the latter part of this month as active buyers. Dealers quote for delivery in the Pittsburgh and nearby districts that take the same rates of freight as follows, per gross ton:

Heavy steel melting scrap, Steuben-	
ville, Follansbee, Brackenridge,	
Sharon, Monessen, Midland and	
Pittsburgh delivery	\$17.25 to \$17.50
Compressed side and end sheet scrap	16.25 to 16.50
No. 1 foundry cast	15.75 to 16.00
Bundled sheet scrap, f.o.b. consumers'	
mills, Pittsburgh district	14.50 to 15.00
Rerolling rails, Newark and Cam-	
bridge, Ohio, Cumberland, Md., and	
Franklin, Pa.	18.00 to 18.25
No. 1 railroad malleable stock	15.50
Railroad grate bars	10.75 to 11.00
Low phosphorus melting stock	20.00 to 20.50
Iron car axles	24.50 to 25.00
Steel car axles	26.00 to 26.50
Locomotive axles, steel	24.00 to 24.50
No. 1 busheling scrap	15.00
Machine shop turnings	9.75 to 10.00
Old carwheels	14.50
Cast-iron borings	10.75 to 11.00
Sheet bar crop ends	18.00 to 18.50
Old iron rails	16.00 to 16.50
No. 1 railroad wrought scrap	18.50 to 19.00
Heavy steel axle turnings	13.50 to 14.00
Heavy breakable cast scrap	13.50 to 14.00

\*Shipping point.

**Coke.**—There is practically no demand for either prompt or future blast-furnace coke. Standard grades of furnace coke are offered for prompt shipment as low as \$2.75 per ton, and contract coke at \$2.50, or less, per net ton at oven. We quote best grades of furnace coke for spot shipment at \$2.75 to \$3, and on contracts

from \$2.50 to \$2.60. We quote best grades of 72-hr. foundry coke for prompt shipment at \$3.50 to \$3.75 and on contract, 3.25 to \$3.50 per net ton at oven. The Connellsville *Courier* reports the output of coke for the week ended Jan. 22 as 400,806 net tons, a decrease over the previous week of 19,715 tons.

## Chicago

CHICAGO, ILL., Feb. 2, 1916.—(By Wire.)

Such tonnage as it had remaining for sale, the leading interest last week distributed proportionately among its customers and is now sold up throughout the year. Another mill is preparing to follow a similar course. A situation such as this is without parallel and its significance is emphasized by the fact that the capacity of other large mills is almost equally engaged, rolling schedules being completed practically through October. The distribution of plates, shapes and bars above mentioned was on the basis of 1.90c. and 2c., Pittsburgh. Other contracts and sales for the last half and fourth quarter were made with structural shapes on a parity with plates and bars at 2c. Steel bars were sold for first half delivery at 2.25c., Pittsburgh, sheared plates at 2.50c. and universal mill plates at 2.60c. The extent to which tonnage to be delivered in the second half has been booked to cover specific jobs is unique and constitutes as strong an assurance of current prices prevailing throughout the year as can well be had. Some of the mills are insisting also that customers favored with tonnage which might equally well be disposed of by outright sale are not protected against declines in price. Railroad buying is not conspicuous but it embraces a steady flow of inquiry and orders for both rolling stock and track equipment. Specifications last week for rolled products of various kinds were exceptionally heavy, probably the heaviest ever experienced in this market. General activity in pig iron has subsided, but the week brought out one negotiation for a large tonnage. The weakness in the old material market is more pronounced, although there are no sharp reductions in price. The failure of January to meet the expectations of heavy buying of scrap has reacted upon the market, increasing measurably the pressure to sell.

**Pig Iron.**—Except for one transaction in which a round tonnage is involved, the business of last week was in lots of modest size, aggregating a total of no importance and being largely of Northern foundry iron. For second half delivery there is practically no iron under consideration. Interest in contracts for this latter shipment has subsided with a uniformity reflecting an opinion common to most melters that, with prices at their present level, the future may well take care of itself. Interest in Southern iron was also largely absent, sales being limited for the most part to spot iron, which brought from \$15 to \$15.50, f.o.b. Birmingham. A disposition to seek evidences of weakness in the situation is making its appearance, but the insistent demand for prompt shipments on first half contracts and the general adherence to price schedules are contrary indications. For Lake Superior charcoal iron we quote delivery prices at Chicago, including a freight of \$1.75. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic iron, which are f.o.b. furnace, and do not include a switching charge averaging 50c. per ton:

Lake Superior charcoal, Nos. 2 to 5	\$19.75
Lake Superior charcoal, No. 1	20.25
Lake Superior charcoal, No. 6 and Scotch	20.75
Northern coke foundry, No. 1	19.00
Northern coke foundry, No. 2	18.50
Northern coke foundry, No. 3	18.00
Southern coke, No. 1 f.dry and 1 soft	\$19.50 to 20.00
Southern coke, No. 2 f.dry and 2 soft	19.00 to 19.50
Malleable Bessemer	18.00
Basic	18.00
Low phosphorus	\$2.00 to 2.50
Silvery, 8 per cent	27.50
Silvery, 10 per cent	28.50

**Rails and Track Supplies.**—The price of tie plates in this market has been advanced to a minimum of \$40, which, though \$17 above the low price, is still below the level of tank plates. The new railroad inquiry for

track materials is not of importance, although rail sales totaling approximately 10,000 tons are reported. We quote standard railroad spikes at 2.25c., base; track bolts with square nuts, 2.50c., base, all in carload lots, Chicago; tie plates, \$40, f.o.b. mill, net ton; standard section, Bessemer rails, Chicago, 1.25c., base, open hearth, 1.34c.; light rails, 25 to 45 lb., 1.52c.; 16 to 20 lb., 1.57c.; 12 lb., 1.62c.; 8 lb., 1.67c.; angle bars, 1.50c., Chicago.

**Structural Material.**—Contracts for fabricated steel closed last week included 850 tons for the Metropolitan Bank Building at Minneapolis, placed with the Minneapolis Steel & Machinery Company; 225 tons for the Culver Military Academy, to be furnished by the Rochester Bridge Company, and two small contracts taken by the Worden-Allen Company and the American Bridge Company. Fabricators are showing a disposition to avoid figuring on large jobs, preferring to conserve their tonnage for the smaller work which is being placed almost entirely on the basis of store prices. An inquiry for 3000 tons, offering to the fabricator a profit of 15 per cent, and with the steel figured at 1.60c., Pittsburgh, has not been considered particularly attractive. The buying of car steel last week included 2500 tons for 500 Baltimore & Ohio underframes and about 600 tons for 500 Chicago Great Western center sills. The Southern Railway has increased its inquiry by 400 cars. Sales of locomotives and miscellaneous equipment for passenger service are reported in considerable number. With respect to plain material, the important development of the week was the distribution by the leading interest of all of its unsold tonnage in the second half. Other mills are preparing to similarly apportion their remaining tonnage, and the indications are that an impressive shortage will be made apparent. For second half delivery the mill price continues for Chicago delivery 2.089c.

We quote for Chicago delivery of structural steel out of stock 2.50c.

**Plates.**—While some of the mills are still holding their price to the level of 3c., Pittsburgh, for plates, there is no record of sales having been made in this market on that basis. Transactions are reported at 2.50c., Pittsburgh, for sheared plates and 2.60c., for universal plates. One mill has given an option until Feb. 15 on 1000 tons of plates and shapes for delivery in the fourth quarter on the basis of 2c., Pittsburgh. We quote for Chicago delivery of plates from mill 2.189c.

The extent to which plate users have been compelled to turn to jobbers' stocks to meet their needs has forced another advance in store quotation on plates, which establishes an unusual spread of \$4 per ton over shapes and bars. We quote for Chicago delivery of plates out of stock 2.70c.

**Sheets.**—Some makers of sheets appear to have adjusted the differential between the blue-annealed and box-annealed basis by advancing the quotation for the latter to 3c., Pittsburgh, for No. 28 black. This quotation does not seem to be general, however, and 2.60c. to 2.70c., Pittsburgh, continues in effect. The demand for sheets in heavier gages continues insistent. We quote for Chicago delivery from mill, No. 10 blue annealed, 2.939c.; No. 28 black, 2.839c. to 2.889c.; No. 28 galvanized, 4.689c. to 5c.

We quote for Chicago delivery from jobbers' stock as follows, minimum prices applying on bundles of 25 or more; No. 10 blue annealed, 2.80c.; No. 28 black, 3c.; No. 20 and heavier galvanized, 4.80c.; No. 22 and lighter, 5c.

**Bars.**—The bar-iron mills with 60 days of work on their books and anticipating a steadily increasing demand for their products, are adhering rigidly to the price of 1.90c. at Chicago mill. Mild steel bars have been sold at 2.25c., Pittsburgh, for first half delivery, this price applying in a number of instances against over-specification of contracts. We quote mill shipments, Chicago, as follows: Bar iron, 1.90c.; soft steel bars, 2.189c.; hard steel bars, 1.90c. to 2c.; shafting, in carloads, 45 per cent off; less than carloads, 40 per cent off.

We quote store prices for Chicago delivery: Soft steel bars, 2.50c.; bar iron, 2.50c.; reinforcing bars, 2.50c., base, with 5c. extra for twisting in sizes  $\frac{1}{2}$  in. and over and usual card extras for smaller sizes; shafting 30 per cent off.

**Rivets and Bolts.**—The top prices for bolts are largely nominal inasmuch as the manufacturers are unable to book additional business for delivery within a reasonable period for doing business. We quote as follows: Carriage bolts up to  $\frac{3}{4}$  x 6 in., rolled thread, 70; cut thread, 65-10; larger sizes, 60-5; machine bolts up to  $\frac{3}{4}$  x 4 in., rolled thread, with hot pressed square nuts, 70-5; cut thread, 70; larger sizes, 60-10; gimlet point coach screws, 70-10; hot pressed nuts, square, \$4 off per 100 lb.; hexagon, \$4.20 off. Structural rivets,  $\frac{3}{4}$  to  $1\frac{1}{4}$  in., 2.60c. to 2.65c., base, Chicago, in carload lots, boiler rivets, 10c. additional.

We quote prices, out of store: Structural rivets, 2.75c.; boiler rivets, 2.85c.; machine bolts up to  $\frac{3}{4}$  x 4 in., 70-12; larger sizes, 65-10; carriage bolts up to  $\frac{3}{4}$  x 6 in., 70-5; larger sizes, 65 off; hot pressed nuts, square, \$4.50, and hexagon, \$4.70 off per 100 lb.; lag screws, 75.

**Cast-Iron Pipe.**—At St. Paul, 2500 tons of pipe has been awarded to the leading interest, which company has also taken 300 tons at Fort Wayne, Ind. New business includes 1500 tons of 60-in., to be bought Feb. 3, at Milwaukee, and 1700 tons for the same city, to be awarded Feb. 9. At Duluth contracts for 1000 tons are to be placed. We quote as follows, per net ton, Chicago: Water pipe, 4 in., \$32.50 to \$33; 6 in. and larger, \$29.50 to \$30, with \$1 extra for class A water pipe and gas pipe.

**Wire Products.**—There is little buying of wire on the basis of the new prices, and this disposition accords well with the mill situation which offers little comfort to the users really in need of material. We quote to jobbers as follows: Plain wire, No. 9 and coarser, base, \$2.239; wire nails, \$2.389; painted barb wire, \$2.539; galvanized barb wire, \$3.239; polished staples, \$2.539; galvanized staples, \$3.239, all Chicago.

**Old Material.**—The selling of Western scrap in Eastern markets, which has been a feature of the past few weeks, has practically ceased. This market is accordingly even more liberally supplied with materials offered for consumption than it has been. With respect to wrought scrap this is particularly noticeable and a further recession in prices has occurred. Heavy melting steel, which two weeks ago brought \$15.75 from a large melter, elicits little or no interest at \$15. The demand for car axles for export continues to absorb all offerings. Recent railroad lists have developed decidedly lower quotations. Additional old material offered includes 6000 tons from the Chicago & Northwestern, 4500 tons from the Santa Fé and 7000 tons from the Baltimore & Ohio. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows.

Per Gross Ton	
Old iron rails	\$17.50 to \$18.00
Relaying rails	19.50 to 20.50
Old carwheels	14.25 to 14.50
Old steel rails, rerolling	17.25 to 17.50
Old steel rails, less than 3 ft.	16.50 to 16.75
Heavy melting steel scrap	14.75 to 15.25
Frogs, switches and guards, cut apart	14.75 to 15.25
Shoveling steel	14.50 to 15.00
Steel axle turnings	11.50 to 12.00

Per Net Ton	
Iron angles and splice bars	\$17.00 to \$17.25
Iron arch bars and transoms	18.00 to 18.50
Steel angle bars	14.00 to 14.50
Iron car axles	19.50 to 20.00
Steel car axles	21.50 to 22.00
No. 1 railroad wrought	15.25 to 15.75
No. 2 railroad wrought	14.00 to 14.50
Cut forge	14.00 to 14.50
No. 1 busheling	12.50 to 12.75
No. 2 busheling	9.00 to 9.25
Pipes and flues	11.25 to 11.75
Steel knuckles and couplers	14.75 to 15.25
Steel springs	15.75 to 16.25
No. 1 boilers, cut to sheets and rings	11.00 to 11.50
Boiler punchings	13.75 to 14.25
Locomotive tires, smooth	17.00 to 17.50
Machine shop turnings	8.50 to 8.75
Cast borings	7.75 to 8.00
No. 1 cast scrap	13.00 to 13.25
Stove plate and light cast scrap	11.00 to 11.25
Grate bars	11.00 to 11.25
Brake shoes	10.25 to 10.75
Railroad malleable	13.50 to 13.75
Agricultural malleable	11.00 to 11.50

The Mitchell-Tappen Company, 50 Broad Street, New York City, has been appointed selling agent for the Dominion Iron & Steel Company, Ltd., Sydney, Cape Breton, Canada.



## Philadelphia

PHILADELPHIA, PA., Feb. 1, 1916.

The continuance or resumption of embargoes by the railroads is disturbing the course of trade in iron and steel in a way more serious than the outside world realizes. Both finished products and raw materials are affected, and the situation is made worse by the uncertainty which prevails. Consumers of steel are clamoring for material, but there is no prospect of early relief for them. Eastern Pennsylvania makers of structural shapes have advanced their minimum price to 2.10c., Pittsburgh base, or 2.259c., Philadelphia. Plates are quoted at 3c., Coatesville, with the mills filled up for months. What would ordinarily be considered an enticing order for 7000 tons of plates has not been entertained. The makers of iron bars have advanced their quotation. Sales of less than 80 per cent ferromanganese indicate that the price for prompt standard material is about \$200, seaboard. The past week—in fact, the last half of January—has been quieter in pig iron, and there is a hint of price shading, but most of the furnaces adhere to their previous quotations. Prompt foundry coke, owing to the freight situation, has sold at \$4.50 per net ton at oven.

**Pig Iron.**—The uncertainties caused by the various freight embargoes are not only holding up shipments to consumers but proving most bothersome to furnace operations, both coke and ore having been held up en route. The conditions seem to change almost from day to day. The Virginia iron makers say their shipments are in a muddle, especially those intended for New England. Some relief was promised a few days ago by the raising of certain embargoes, but it was short-lived because of the rush to get material through. In one instance, several cars of ore in the course of delayed transit, were exposed to both rain and cold with the result that the ore reached the furnace frozen to a solid mass on which dynamite had to be used. In the last half of January foundry irons were decidedly less active than in the first half of the month; in fact, with some sellers the market has been almost at a standstill the past week. The explanation of the situation is that consumers are now taking the iron which they bought in the recent period of activity. Most of the business has been in small lots, but a few transactions, either closed or about to be, are noteworthy as to size. The Pennsylvania Railroad is about to order 1000 tons of charcoal iron, and the Baldwin Locomotive Works, 1500 to 3000 tons of cylinder iron and 2000 to 4000 tons of floor iron. A local pipe works took 4000 to 5000 tons of gray forge. Some tentative inquiries involving large tonnages are known to be in hand. The trade is looking forward to filling railroad requirements. The quotation for eastern Pennsylvania No. 2 X is unchanged at \$20, furnace, or \$20.75, Philadelphia, the latter being the quotation for Virginia No. 2 X, also, delivered in this vicinity, but that prices have been shaded is admitted. Basic continues quiet, but the largest local consumer has yet to buy for the third quarter. Consumers of standard low phosphorus are showing interest in future deliveries. For instance, a consumer who usually buys only for the ensuing quarter, has bought for the first half and is now inquiring for the last half. The quotation is unchanged at about \$32, Philadelphia, but the market is largely one where prices are determined in individual deals. Lebanon low phosphorus is quoted at \$29 to \$31, furnace, and in the week about 1200 tons of off iron was taken. Quotations for standard brands, delivered in buyers' yards, prompt shipment, range about as follows:

Eastern Pa., No. 2 X foundry.....	\$20.00 to \$20.75
Eastern Pa., No. 2 plain.....	19.75 to 20.50
Virginia, No. 2 X foundry.....	20.00 to 20.75
Virginia, No. 2 plain.....	19.50 to 20.25
Gray forge.....	19.00 to 19.75
Basic.....	19.50 to 20.00
Standard low phosphorus.....	32.00

**Iron Ore.**—Arrivals of foreign ore at this port in the week ended Jan. 29 totaled 12,300 tons from Cuba.

**Ferroalloys.**—The ferromanganese situation is an uncertain one. Some representatives of English mak-

ers are not quoting at all, either because their principals do not ship or because they are sold up to the end of the year, while others quote \$125, seaboard, for the last half. Prompt material is practically not to be had. About 110 tons of domestic ferromanganese, in four lots, ranging from 50 to 70 per cent, manganese, was purchased in the week at a price equivalent to \$200 for 80 per cent, or \$2.50 per unit of manganese. The purchase was made by a broker, and it is assumed that a consumer will pay more than the price to which reference has been made. A dealer made an unsuccessful effort to take the four lots on the basis of \$175 for 80 per cent. The inquiry for spiegeleisen is heavy. Standard 20 per cent is quoted at about \$37 to \$38, delivered. Blast-furnace ferrosilicon, 11 per cent, is quoted at \$29, furnace, or \$32.44, Philadelphia.

**Bars.**—The nominal quotation for steel bars is 1.90c., Pittsburgh, or 2.059c., Philadelphia, where contracts are involved. Iron bars, in carload lots, have been advanced by eastern Pennsylvania makers to 2.25c., Pittsburgh, or 2.409c., Philadelphia, under a strong demand. The inquiry for steel rounds for shell making is heavy from both domestic and foreign sources. An Eastern mill is offering 1000 tons of 3¼-in. bars, rejected because of surface imperfections, yet suitable for shafting and other purposes.

**Plates.**—The minimum of one mill is 3c., Coatesville, only specifications under contracts coming below that figure, but this mill is loaded up for nine months. Another large maker is confronted by the same conditions. With another, 2.909c., Philadelphia, is quoted, but it can make no prompt deliveries. An inquiry from the Far West, which was considered but not favorably acted on, called for 7000 tons of ½-in. plates, of one size, shipments to begin in May and continue at the rate of 500 tons per week. A proportionate quantity of steel bars was included in the inquiry.

**Structural Material.**—The minimum quoted by an eastern Pennsylvania maker has been advanced from 2.159c. to 2.259c., Philadelphia. The miscellaneous demand continues good, including a fair tonnage of bridge-work required by railroads, but new building operations are notably few.

**Billets.**—Quotations are confined to forward deliveries, and the nominal quotations are unchanged at \$40 to \$45 for open-hearth rerolling billets, and \$55 to \$60 for forging billets.

**Sheets.**—No. 10 blue annealed sheets are stronger than ever at 2.75c. to 3c., Pittsburgh, equal to 2.905c. and 3.159c., Philadelphia.

**Coke.**—Prompt foundry coke has been sold at \$4.50 per net ton at oven, and is quoted at \$4.50 to \$5. The railroad embargoes have upset the market completely. Prompt furnace was quoted last week at \$3.50 to \$4 at oven. Both foundry and furnace have been active. Contract furnace ranges from \$2.50 to \$2.75 per net ton at oven for first half, and contract foundry at \$3.25 to \$3.75. Freight rates from the principal producing districts are as follows: Connellsville, \$2.05; Latrobe, \$1.85, and Mountain, \$1.65.

**Old Material.**—Heavy melting steel continues strong. Rolling-mill scrap is about the same as it was a week ago. Cast scrap is in demand. Both shippers and mills are hampered by the bad freight conditions. Quotations for delivery in buyers' yards in this district, covering eastern Pennsylvania, and taking freight rates from 35c. to \$1.35 per gross ton, are as follows:

No. 1 heavy melting steel.....	\$16.50 to \$17.00
Old steel rails, rerolling.....	19.00 to 20.00
Low phos. heavy melting steel scrap..	21.50 to 22.50
Old steel axles.....	25.00 to 26.00
Old iron axles.....	27.00 to 28.00
Old iron rails.....	19.50 to 20.00
Old carwheels.....	16.50 to 17.00
No. 1 railroad wrought.....	22.00 to 22.50
Wrought-iron pipe.....	15.75 to 16.25
No. 1 forge fire.....	14.00 to 14.50
Bundled sheets.....	14.00 to 14.50
No. 2 busheling.....	11.00 to 11.50
Machine shop turnings.....	10.00 to 10.50
Cast borings.....	11.00 to 11.50
No. 1 cast.....	17.00 to 18.00
Grate bars, railroad.....	12.50 to 13.00
Stove plate.....	13.00 to 13.50
Railroad malleable.....	15.00 to 15.50

## Buffalo

BUFFALO, N. Y., Feb. 1, 1916.

**Pig Iron.**—With the few notable exceptions of the placing by users of large tonnages since Jan. 1, the rank and file of buyers are apparently withholding orders. The International Steam Pump Company has closed with a Buffalo maker for 500 tons of foundry iron for prompt delivery to its New Jersey plant. Bids are before pipemakers for 1000 tons of 36-in. cast-iron pipe for Jamestown, N. Y., and it is reported that Utica will soon ask for bids for 2300 tons of 6 to 10-in. pipe. Furnace shipments on contracts continue exceedingly heavy but the varying embargoes hamper the free distribution of product. The average price for No. 2 X is about \$18.50 at furnace, for immediate delivery and \$19 for later delivery. Some of the higher silicon irons are bringing \$21 to \$23, at furnace. We quote as follows, f.o.b. furnace, Buffalo, for current and last half delivery:

No. 1 foundry .....	\$18.50 to \$19.00
No. 2 X foundry .....	18.00 to 19.00
No. 2 plain .....	18.00 to 19.00
No. 3 foundry .....	17.50 to 19.00
Gray forge .....	17.50 to 19.00
Malleable .....	19.00 to 20.00
Basic .....	19.00 to 20.00
Charcoal, regular brands and analysis	21.00 to 22.00

**Finished Iron and Steel.**—There is little inclination on the part of the mills to take contracts. The actual tonnage scheduled against the mills is greater than at any other time during the present congestion. The price for steel bars, small shapes and structural material remains at 1.90c., Pittsburgh, with plates nominally at 2c., but with no sellers, all producers of plates being practically out of the market. An inquiry for 2000 tons of plates for a Canadian shipbuilding company finds no mill in position to promise delivery. Warehouse demand is increasing tremendously for all classes of material, and warehouse stocks are becoming low, and it is increasingly difficult for them to replenish. It is expected that bids will soon be taken by the State Superintendent of Public Works, Albany, for steel sheet piling and structural steel for reconstruction of the Erie Barge Canal dam at Tonawanda, N. Y., partly swept away recently by flood. Bids will also soon be taken for 400 tons of steel for Monseigneur Baker's Rectory, Buffalo. The Lackawanna Bridge Company has secured 1000 tons additional for the open-hearth steel plant for the Lukens Iron & Steel Company, at Coatesville, Pa. The Progressive Steel Company, Buffalo, has taken 100 tons for the Columbia Turn Verein Club House, Buffalo, and 100 tons for the Black Rock Bank, Buffalo. The Donner Steel Company has begun operating two of its open-hearth furnaces and its blooming mill, and will soon let contracts for its ore dock.

**Old Material.**—The week has shown good inquiry for most commodities, with large demand for No. 1 railroad wrought scrap, resulting in an increase of \$1 per ton in price. No. 1 machinery and railroad wrought scrap has also strengthened and shows a maximum advance of 75c. per ton, and old iron axles and old steel axles and stove plate have gone up \$1 per ton, owing to increased demand. An optimistic feeling prevails and dealers are confident that increases in prices will be reached very shortly in other lines than those mentioned, particularly in heavy melting steel, which is now strong at \$16.50 to \$17. We quote dealers' asking prices, per gross ton, f.o.b. Buffalo, as follows:

Heavy melting steel .....	\$16.50 to \$17.00
Low phosphorus steel .....	21.00 to 21.50
No. 1 railroad wrought scrap .....	19.00 to 19.50
No. 1 railroad and machinery cast scrap .....	16.00 to 16.50
Old steel axles .....	24.00 to 24.50
Old iron axles .....	24.00 to 24.50
Old carwheels .....	15.25 to 15.75
Railroad malleable .....	15.25 to 15.75
Machine shop turnings .....	7.75 to 8.25
Heavy axle turnings .....	12.00 to 12.50
Clean cast borings .....	9.25 to 9.75
Old iron rails .....	17.50 to 18.00
Locomotive grate bars .....	11.50 to 12.00
Stove plate (net ton) .....	11.00 to 11.50
Wrought pipe .....	13.00 to 13.50
Bundled sheet scrap .....	12.00 to 12.50
No. 1 busheling scrap .....	14.50 to 15.00
No. 2 busheling scrap .....	11.00 to 11.50
Bundled tin scrap .....	15.00 to 15.50

## Cincinnati

CINCINNATI, OHIO, Feb. 2, 1916.—(By Wire.)

**Pig Iron.**—Foundry iron in this immediate vicinity is quiet. The largest sale reported covers 500 tons of Southern iron to a local melter for second and third quarter delivery. The same buyer also took a small tonnage of Northern iron. Transactions in outside territory have been large. Several Michigan consumers of foundry iron bought heavily last week, one of them booking 10,000 tons of Northern foundry for last half shipment. Another contracted for 6000 tons of Lake Superior charcoal and three lots of Ohio silvery iron were taken, the total being 4000 tons. One concern alone bought 2500 tons of silvery, which is counted as a very large contract for this kind of iron. About 3000 tons of Northern foundry was sold in central Ohio, and an Indiana melter purchased 500 tons, both for last half shipment. A number of medium sized sales of Southern carwheel iron have been made in this territory lately, and the minimum price now is \$22.50, Birmingham basis. Prompt Southern No. 2 foundry is still available at \$14.50, Birmingham basis, but the majority of the producers are holding at \$15 for prompt shipment and all the way from \$15 to \$16.50 for last half delivery. Northern foundry, malleable and basic are unchanged at \$18, Ironton, for any shipment this year. The Ohio silvery irons are quoted at \$25, at furnace, based on an 8-per cent analysis. Based on freight rates of \$2.90 from Birmingham and \$1.26 from Ironton, we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 f'dry and 1 soft.	\$17.90 to \$18.40
Southern coke, No. 2 f'dry and 2 soft.	17.40 to 17.90
Southern coke, No. 3 foundry .....	16.90 to 17.40
Southern No. 4 foundry .....	16.40 to 16.90
Southern gray forge .....	15.90 to 16.40
Ohio silvery, 8 per cent silicon .....	26.26 to 26.76
Southern Ohio coke, No. 1 .....	20.76 to 21.26
Southern Ohio coke, No. 2 .....	19.76 to 20.26
Southern Ohio coke, No. 3 .....	19.26 to 19.76
Southern Ohio malleable Bessemer .....	19.26 to 19.76
Basic, Northern .....	19.26 to 19.76
Lake Superior charcoal .....	21.20 to 22.20
Standard Southern carwheel .....	25.40 to 25.90

## (By Mail)

**Finished Material.**—The local jobbers have advanced wire nails to \$2.30 per keg base, f.o.b. Cincinnati, and barb wire to \$3.20 per 100 lb. Retail hardware dealers placed some good-sized orders before the recent advance took place and those who did not get under cover are buying freely at the present quotation, as indications are that prices will still go higher. The nearby mills are quoting No. 28 galvanized sheets at 5.15c., Cincinnati or Newport, Ky., and No. 28 black sheets at 2.65c. The warehouse price on galvanized sheets is strong at 5c. and No. 10 blue annealed 2.70c. The store price of steel bars remains at 2.45c. and structural shapes at 2.55c.

**Old Material.**—A better demand from rolling mills and foundries is reported and as a consequence prices are firmer, although no changes have been made. The minimum prices given below represent what dealers are willing to pay for delivery in their yards, southern Ohio and Cincinnati, and the maximum quotations are dealers' prices f.o.b. at yards.

## Per Gross Ton

Bundled sheet scrap .....	\$10.75 to \$11.25
Old iron rails .....	15.50 to 16.00
Relaying rails, 50 lb. and up .....	21.00 to 21.50
Rerolling steel rails .....	14.25 to 15.25
Heavy melting steel scrap .....	14.25 to 14.75
Steel rails for melting .....	14.00 to 15.00

## Per Net Ton

No. 1 railroad wrought .....	\$13.50 to \$14.00
Cast borings .....	7.50 to 8.00
Steel turnings .....	7.25 to 7.75
Railroad cast scrap .....	11.75 to 12.00
No. 1 machinery scrap .....	13.50 to 14.00
Burnt scrap .....	8.75 to 9.25
Iron axles .....	19.25 to 19.75
Locomotive tires (smooth inside) .....	13.25 to 13.75
Pipes and flues .....	10.25 to 10.75
Malleable and steel scrap .....	10.75 to 11.25
Railroad tank and sheet scrap .....	8.75 to 9.25

**Coke.**—Prompt shipment prices on Connellsville coke are easing off and to-day's quotations on furnace coke are \$3.50 to \$3.75 per net ton at oven and on foundry coke \$4 to \$4.75. Contract figures on 48-hr.



coke range from \$2.30 to \$2.65 and on 72-hr. coke from \$3 to \$3.60. Conditions are unchanged in the Wise County and Pocahontas fields, and we quote furnace coke from \$2.75 to \$3 and foundry coke, \$3.25 to \$3.75. No large contracts have been made in this territory for either furnace or foundry grades.

## Cleveland

CLEVELAND, OHIO, Feb. 1, 1916.

**Iron Ore.**—While the market is inactive there is still some buying of ore in small lots. Mining operations in the Lake Superior district are being pushed to maximum production and there will be good-sized stock piles at the opening of navigation. Owing to the late rush in ore shipments last season stock piles were well cleaned up before navigation closed. Dock shipments from Lake Erie ports are heavy. We quote as follows for delivery at lower Lake ports: Old range Bessemer, \$4.45; Mesaba Bessemer, \$4.20; old range non-Bessemer, \$3.70; Mesaba non-Bessemer, \$3.55.

**Pig Iron.**—The Ford Motor Company has purchased about 50,000 tons of foundry iron, mostly for the last half, from Detroit and Toledo furnaces. Other sales in the past few days include two lots of about 5000 tons each to Cleveland consumers and 7000 tons of northern Ohio foundry, 5000 tons of this being taken by a Cleveland furnace and 2000 tons by a Valley producer. One Cleveland agency reports sales aggregating 140,000 tons during January. While the price for Cleveland delivery is maintained at \$19 for No. 2 foundry, local furnaces that have been asking the same price for out-of-town shipments are now quoting at \$18.50 for outside shipment, putting their prices on practically the same basis as Valley furnaces that are making sales at \$18.50, although some furnaces are asking \$18.75 to \$19. However, the \$18.50 price now generally represents the market. Much of the buying is by foundries having contracts for automobile castings extending through the year. There is a considerable tendency among foundries that have not made contracts for castings for last half and delay buying pig iron. Among the new inquiries is one from a northern Ohio manufacturer for 1000 tons of foundry iron for last half. Southern iron is selling quite freely for last half in lots of from 100 to 300 tons at \$15.50, Birmingham, for No. 2. Southern iron for the first half is quoted at \$15. We quote delivered Cleveland as follows:

Bessemer .....	\$21.45 to \$21.95
Basic .....	18.95 to 19.30
Northern No. 2 foundry .....	19.30
Southern No. 2 foundry .....	19.00 to 19.50
Gray forge .....	18.30
Jackson Co. silvery 8 per cent silicon .....	26.62
Standard low phos., Valley furnace .....	31.00

**Coke.**—A northern Ohio foundry has contracted for 50 tons of Connellsville foundry coke for the last half at \$4 per net ton at oven. Quotations range from \$3.25 to \$3.75 per net ton at oven for the best makes for the first half and \$3.50 to \$4 for early shipment, although, owing to the car shortage, quotations have been made as high as \$5 per ton this week for spot shipment. Inquiries are rather light.

**Finished Iron and Steel.**—There is considerable new inquiry for third quarter contracts and for steel for specific work, but most of the mills are still so congested that they will not take the contracts. A few contracts are being placed at 1.90c., Pittsburgh, for steel bars, plates and structural material for the third quarter and for delivery at the convenience of the mills, and protection has been given structural material for specific work at 2c. An inquiry is pending for several additional boats for Norway, the order for which will probably be placed with the American Shipbuilding Company within a day or two. These will require 8050 tons of steel. Prices on iron bars have been advanced \$2 a ton to 2.35c., Cleveland, and on hard steel bars quotations lower than 2c., Pittsburgh, are no longer being made. One Pittsburgh district mill that has been quoting steel bars and plates at 2.25c. has advanced its price to 2.35c. for delivery within four to six weeks. The demand for plates continues heavy, and local prices are firm at 2.75c. to 3c., Pittsburgh, for

prompt shipment. In structural lines the Mount Vernon Bridge Company has taken 3000 tons for a bridge in Ashland, Ky., and the King Bridge Company has taken 530 tons for a Nickel Plate bridge in Erie, Pa. Inquiry for sheets is active and prices are very firm at 2.50c. to 2.75c., Ohio mill, for No. 28 black; 2.60c. to 2.75c. for No. 10 blue annealed, and 4.75c. to 4.90c. for No. 28 galvanized. Another advance in warehouse prices on blue annealed sheets has been made to 3.25c. and warehouse prices on shafting have been advanced to 20 off. Other warehouse prices are unchanged at 2.60c. for steel bars; 2.70c. for plates and structural material.

**Bolts, Nuts and Rivets.**—Rivet prices have again been advanced \$2 a ton to 2.70c., Pittsburgh, for structural and 2.80c. for boiler rivets for immediate specification, with a further advance of \$2 a ton for second quarter contracts. The demand for bolts and nuts continues heavy. Although there is usually a falling off in January the volume of orders during the past month was about as large as during December. We quote bolt and nut discounts as follows:

Common carriage bolts  $\frac{3}{4}$  and 6 in., smaller or shorter, roll thread, 70 off, cut thread, 65 and 10; larger or longer 60 and 5; machine bolts with h. p. nuts,  $\frac{3}{4}$  x 4 in., smaller and shorter, roll thread, 70 and 5; cut thread, 70, larger and longer, 60 and 10; lag bolts, gimlet or cone point, 70 and 10, square h.p. nuts, blank or tapped, \$4 off the list; hexagon h.p. nuts, blank or tapped, \$4.20 off; c.p.c. & t. square nuts, blank or tapped, \$3.75 off; hexagon nuts, 11 sizes, \$4.75 off; cold pressed semi-finished hexagon nuts, all sizes, 75 and 10 off.

**Old Material.**—During the open weather the past few days shipments have been very heavy. Considerable congestion has resulted and some of the local mills are holding back on shipments. There is some complaint among Cleveland rolling mills of labor shortage which is curtailing production and the consumption of scrap. Heavy shipments have resulted in the slight easing off in prices of material on track and most mills are out of the market. Dealers look for firmer prices, in a few days and are not offering their yard stocks. Quotations, f.o.b., Cleveland, are unchanged as follows:

Per Gross Ton	
Old steel rails .....	\$15.75 to \$16.00
Old iron rails .....	19.00
Steel car axles .....	25.00 to 26.00
Heavy melting steel .....	16.00 to 16.50
Old carwheels .....	14.00 to 14.50
Relaying rails, 50 lb. and over .....	22.50
Agricultural malleable .....	14.00 to 14.25
Railroad malleable .....	17.00 to 17.25
Steel axle turnings .....	13.50 to 14.00
Light bundled sheet scrap .....	12.75 to 13.25

Per Net Ton	
Iron car axles .....	\$24.00 to \$25.00
Cast borings .....	8.50 to 9.00
Iron and steel turnings and drillings .....	7.25 to 7.75
No. 1 bushing .....	13.50 to 14.00
No. 1 railroad wrought .....	17.00 to 17.50
No. 1 cast .....	13.00 to 13.50
Railroad grate bars .....	10.50 to 11.00
Stove plate .....	10.50 to 11.00

## Birmingham

BIRMINGHAM, ALA., Jan. 31, 1916.

**Pig Iron.**—Stop shipment orders, which have recently come in with frequency, are attributed to the very reasonable desire by consumers to use all the low-priced metal ordered by them before receiving and paying for the higher-priced. This situation has been met by one furnaceman in this way—both low-priced and high-priced metal are delivered and the average price is charged. The situation will clear up soon because the melt is large and the low-priced iron should disappear. The leading interest continues to name \$15 and \$16 for first and second halves respectively, but reports current business light, consumers being well supplied. The Sloss-Sheffield, Woodward and Republic companies quote \$15.50 for first half and do current business on that basis. A sale of 350 tons of No. 2 for third quarter was made at \$16.50. As high as \$17.50 has been paid for Clifton high silicon iron. Warrant iron Jan. 1 in Alabama yards was almost to a ton the same as on Dec. 1. Incidentally, it is known that one-half of this iron, 45,000 tons, is the property of two large consumers and will never figure as resale metal. Pig iron made in Tennessee has been selling

50c. per ton under Birmingham iron. This is to be expected, the freight to delivery points being that much under the Birmingham rate. The Republic Company has resumed at one of the two stacks recently disabled by a gas explosion and the other will probably resume by the end of the week. Extensive additions to the Tennessee and Mississippi River barge line equipment speaks well for the recently inaugurated iron movement from Chattanooga, Florence and Sheffield to northwestern junction points. We quote, per gross ton, f.o.b. Birmingham district furnaces, as follows:

No. 1 foundry and soft.....	\$15.50 to \$16.00
No. 2 foundry and soft.....	15.00 to 15.50
No. 3 foundry.....	14.50 to 15.00
No. 4 foundry.....	14.25 to 14.75
Gray forge.....	14.00 to 14.50
Basic.....	15.00 to 15.50
Charcoal.....	23.00 to 23.50

**Cast-Iron Pipe.**—Pipe manufacturers are inclined to be pleased with the manner in which winter business is going. Additional orders from Western municipalities have been received and the inquiry is rather brisk. Indications point to large orders for spring stocks of sanitary pipe. Prices are up \$1 per ton. We quote, per net ton, f.o.b. pipe shop yards, as follows: 4-in., \$27; 6-in. and upward, \$25, with \$1 added for gas pipe 16-ft. lengths.

**Coal and Coke.**—The resumption of the foundry coke traffic with Mexico appears to be on a sure footing. Regular shipments are being made of 5000 to 8000 tons monthly by the Pratt Consolidated Coal Company, and the Alabama Company and Hammond-Byrd Company are also making shipments. Foundry coke is firm at higher prices. We quote, per net ton, f.o.b. oven, as follows: Beehive furnace, \$2.75 to \$3; foundry, \$3.50 to \$3.75 for run of ovens and hand-picked respectively, with Yolande at \$4. The independent coal operators report a continuance of brisker conditions since the furnace companies got out of the way, but the improvement is by small degrees.

**Old Material.**—The demand for steel scrap is excellent and all obtainable is quickly taken off the yards. No. 1 machinery is in especially good demand. Altogether, satisfactory conditions prevail in the scrap market. We quote, per gross ton, f.o.b. dealers' yards, as follows:

Old iron axles.....	\$14.50 to \$15.00
Old steel axles.....	14.00 to 14.50
Old iron rails.....	13.50 to 14.50
No. 1 railroad wrought.....	10.50 to 11.00
No. 2 railroad wrought.....	9.00 to 9.50
No. 1 country wrought.....	9.00 to 9.50
No. 1 machinery cast.....	10.00 to 10.50
No. 1 steel scrap.....	10.00 to 10.50
Tram carwheels.....	10.00 to 10.50
Stove plate.....	8.00 to 8.50

## St. Louis

ST. LOUIS, MO., Jan. 31, 1916.

**Pig Iron.**—Buying is largely of the fill-in order, but specifications are very liberal. Practically all the sales were odd lots. The only inquiry of importance is 800 tons of Northern No. 2 foundry for first half delivery. Ferromanganese is very scarce and small lots have sold on a basis of \$200 per ton. Spiegeleisen has been quoted at \$35 per ton, furnace, with little prospect of getting early delivery.

**Coke.**—The market has been excited with none obtainable, apparently, even at the high figures named with a range of \$4.50 to \$6 per ton for Connellsville and \$3.75 to \$4.25 for Virginia, any delivery. By-product continues to maintain the Connellsville parity in quotations, but not where there is real competition. Then lower prices appear, particularly from the local interest.

**Finished Iron and Steel.**—There has been the usual steady run of business keeping the aggregate well up to past figures, but little disposition to contract ahead. Tank plate is much harder to get than last week and prices are firmly held. Standard section steel rails show no life, but light rails are much firmer and quoted on a basis of \$1.43 to \$1.48, Pittsburgh. Bars are in demand and at 10c. over the Pittsburgh base of \$1.90 for structural. Tank plates are quoted at \$2.25, Pittsburgh. Track fastenings are in fair demand at firm

prices. Movement out of warehouse is good at the following quotations: Soft steel bars, 2.55c.; iron bars, 2.50c.; structural material, 2.55c.; tank plates, 2.75c.; No. 10 blue annealed sheets, 2.85c.; No. 28 black sheets, cold rolled, one pass, 3.20c.; No. 28 galvanized sheets, black sheet gage, 5.25c.

**Old Material.**—The market is listless, due to the embargoes which prevent shipment to mills or to the East for export. In consequence there is very little disposition to buy. On some items the quotations given are purely nominal. This is particularly true of old carwheels. Relaying rails are strong in the lighter sections and fairly good in standard sections. No lists appeared during the week except one from the Wabash, the third for the month, of 200 tons. We quote dealers' prices, f.o.b. customers' works, St. Louis industrial district, as follows:

Per Gross Ton	
Old iron rails.....	\$15.25 to \$15.75
Old steel rails, rerolling.....	16.50 to 17.00
Old steel rails, less than 3 ft.....	16.25 to 16.75
Relaying rails, standard section, subject to inspection.....	21.00 to 23.00
Old carwheels.....	13.25 to 13.75
No. 1 railroad heavy melting steel scrap.....	14.75 to 15.25
Heavy shoveling steel.....	13.00 to 13.50
Frogs, switches and guards cut apart.....	14.75 to 15.25
Bundled sheet scrap.....	9.75 to 10.25

Per Net Ton	
Iron angle bars.....	\$14.75 to \$15.25
Steel angle bars.....	13.00 to 13.50
Iron car axles.....	19.75 to 20.25
Steel car axles.....	20.75 to 21.25
Wrought arch bars and transoms.....	16.75 to 17.25
No. 1 railroad wrought.....	14.25 to 14.75
No. 2 railroad wrought.....	13.75 to 14.25
Railroad springs.....	14.25 to 14.75
Steel couplers and knuckles.....	14.25 to 14.75
Locomotive tires, 42 in. and over, smooth inside.....	14.25 to 14.75
No. 1 dealers' forge.....	11.75 to 12.25
Mixed borings.....	7.75 to 8.25
No. 1 busheling.....	12.25 to 12.75
No. 1 boilers, cut to sheets and rings.....	9.75 to 10.25
No. 1 railroad cast scrap.....	12.25 to 12.75
Stove plate and light cast scrap.....	9.25 to 9.75
Railroad malleable.....	11.25 to 11.75
Agricultural malleable.....	9.75 to 10.25
Pipes and flues.....	9.75 to 10.25
Railroad sheet and tank scrap.....	9.00 to 9.50
Railroad grate bars.....	9.25 to 9.75
Machine shop turnings.....	9.25 to 9.75

## San Francisco

SAN FRANCISCO, CAL., Jan. 25, 1916.

While delivery and construction work at outside points have been checked by severe weather, business in nearly all departments has increased rapidly for the last fortnight. The small jobbing trade shows exceptional activity, and merchants are specifying more heavily to meet the increased requirements. Inquiries are also coming out for good sized lots of material for heavy construction of various kinds; mining, lumber and oil interests are all in the market, while shipbuilders are having considerable difficulty in securing sufficient material. Plenty of export business is still available, but this is being rather lost sight of in view of the domestic activity. Most mills are looking after their regular trade fairly well, but it is hard to place new business, even at extreme prices.

**Bars.**—Both soft steel and reinforcing bars are in stronger demand. Several good sized contracts have been placed for the latter, and more inquiries are appearing all the time. Merchants are getting a lively business in small lots from stock, and find difficulty in keeping their assortments complete. While the larger buyers are fairly well covered by contracts, deliveries are slow, and a great deal of new business is offered. Local mills have their output well sold for some time ahead, and are asking about 2.60c. for delivery at their convenience, small lots from store being quoted at 3.35c.

**Structural Material.**—Building is fairly active. The Pacific Coast Steel Company has let a small fabricating contract for an addition to its plant at South San Francisco. The Great Western Power Company has plans for a class A distributing station. The Ralston Iron Works has about 800 tons of the Union Iron Works foundry, and a good sized jail job at Sacramento. The local office of Milliken Brothers, Inc., has taken



1000 tons of steel towers for the Pacific Gas & Electric Company. Plans will be out shortly for a large hotel at Eighth and Spring streets, Los Angeles. Inquiries are expected for State buildings at San Francisco and Los Angeles, and preliminary work is under way for the addition to the Capitol at Sacramento. Oakland parties have started a movement to build a new bascule bridge over the Oakland Estuary.

**Rails.**—A number of inquiries for standard sections have lately come from lumber interests, and a fair tonnage has been placed, though buyers are looking for relayers. The mine rail business is fair, and a good demand for industrial track is expected as soon as the weather settles.

**Plates.**—The past few weeks have brought out a large volume of new business, including several important oil tank and pipe contracts and a substantial tonnage of marine work. Even small shops, whose purchases have long been almost negligible, are endeavoring to hasten delivery on carload orders, and the movement from jobbers' stocks is heavy. The demand far exceeds the supply, and few mills are able to take any new business for early delivery, 2.25c., Pittsburgh, being the inside price for delivery in two to three months. The local jobbing price has been advanced to 3.45c.

**Sheets.**—The demand for blue annealed has picked up remarkably, a heavy tonnage being required for pipe and tank work, oil drums, etc., and some buyers have had considerable difficulty in placing their orders. In many cases price has seemed to be no object, and the delay in deliveries has diverted a large volume of business to merchants. The movement of galvanized, though not exceptionally heavy, is above expectations under the conditions.

**Wrought Pipe.**—The pipe trade shows a sharp revival, the leading interest reporting the best month for general business since 1912. The greatest improvement has been in the oil fields, as a decrease in oil in storage has started active drilling again. Orders for boiler tubes have been unusually large, and many jobbers are placing large orders for merchant pipe, in anticipation of further advances.

**Cast-Iron Pipe.**—Current business is not heavy, the largest inquiry being for 500 tons for a Los Angeles water district. Douglas, Ariz., is taking bids on a few cars of 4 and 6 in. pipe, and Santa Ana, Cal., takes bids Feb. 6 on 250 tons. The number of towns voting on water system projects is encouraging. Prices are higher, being \$35 per net ton for 6-in. and over; \$38 for 4-in., and \$1 extra for class A and gas pipe.

**Pig Iron.**—The outlook for foundry business is encouraging melters to place additional contracts for domestic iron, mainly for Southern foundry, though first half requirements are now pretty well covered. Prices are a little higher, No. 1 Southern foundry being \$27 per gross ton, San Francisco, for first half, and about \$27.50 for second half.

**Coke.**—A substantial tonnage is now coming forward on contracts, and a good many foundries are still buying, as old stocks become exhausted. Southern beehive coke is quoted here at about \$16 per net ton.

**Ferroalloys.**—Ferromanganese and ferrosilicon are in strong demand, with very little available, and prices are uncertain, with an upward tendency. The only stock of ferrosilicon on the Pacific coast market at present is said to be in the hands of one local firm, and is very closely held, with nothing further available except for April or May delivery. The development of the chrome and manganese ore business for shipment to Eastern manufacturing points has brought a reduction in the freight rate by the Southern Pacific Railroad, the rate to points east of Chicago and west of the Atlantic seaboard being cut to 55c. per 100 lb., in minimum carloads of 80,000 lb., from a former range of 68c. to 75c. A reduced rate is also expected shortly on magnesite, a heavy tonnage of which is being shipped from California to Eastern steel manufacturing districts.

**Old Material.**—Steel scrap continues very active at about \$8 to \$11 per gross ton. While there is apparently an abundance of scrap in the country, the

heavy demand is causing a firmer feeling among holders, and higher prices before the end of the year are by no means beyond the range of possibility. Cast-iron scrap is in ample supply at \$12 to \$14 per net ton. The Government tank steamer Maumee will take 600 tons of scrap from Mare Island to the New York naval station.

## New York

NEW YORK, Feb. 2, 1916.

**Pig Iron.**—The market is quiet with little buying noted and but few inquiries reported. A sale of 1000 tons of Southern foundry iron has been made very recently and a few small lots aggregating about 1000 tons have changed hands, all at the prevailing market quotations. Inquiries for about 1000 tons are noted besides 500 tons of off-grade spot iron by a New Jersey foundry to replace scrap. The closing of a contract of about 50,000 tons of basic iron for a large Eastern steel company will probably take place this week, the iron to be delivered from August on. The price situation is not weak but the market in general is unusually inactive. There are insistent foreign inquiries but the embargoes and freight situation militate against many sales being consummated. Conditions in New England are again aggravated by the second embargo placed by the Pennsylvania Railroad the past week on shipments east of Trenton. Additional foundries in that territory are reported shut down or operating at least from hand to mouth because of a lack of pig iron or coke. We quote at tidewater as follows for early delivery: No. 1 foundry, \$20.25 to \$20.75; No. 2 X, \$19.75 to \$20; No. 2 plain, \$19 to \$19.25. Southern iron at tidewater, \$20 to \$20.50 for No. 1 and \$19.50 to \$20 for No. 2 foundry and No. 2 soft.

**Ferroalloys.**—With practically every representative of British producers of ferromanganese out of the market for several months to come and with domestic producers sold up to at least July 1, predictions are made that spot material will sell as high as \$250 or more per ton soon. Sales for immediate delivery have been made as high as \$180 to \$190 per ton, seaboard, and a fair quantity of alloy of low manganese content, 50 per cent and over, has been bought at \$2.50 per unit. Receipts in January are estimated to have been at about the same rate as in the last quarter of 1915, about 4800 tons per month, but most of this is for delivery on contract. Spiegeleisen has advanced \$2.50 per ton, to \$35, furnace, for delivery after July 1, none being available from either of the principal domestic producers before that time. Ferrosilicon, 50 per cent, continues to be in stronger demand than ever before, with sales at not less than \$90, furnace, not infrequent. A new American producer, only recently a factor in the market, will have a second electric furnace in operation in the early summer, turning out about 30 tons per day. Another American producer is reported to have increased his output recently. The last quotations for forward delivery were \$84 to \$86, Pittsburgh.

**Structural Material.**—The intermittent embargoes of the railroads are seriously affecting the delivery of steel, and it is expected that adjustments on this account will have to be taken into consideration for months, as much relief is not expected in 1916. Over 10 000 tons of fabricated work was put under contract in the week, of which 4600 tons may be regarded as railroad work, and the remainder for public and private buildings. The sentiment of the trade is good and prices are firmer. Besides 2000 tons for subway work in New York for the Interborough company, of which 1000 went to the American Bridge Company and 1000, it is believed, to Milliken Brothers, Inc., the Pennsylvania Railroad has recently closed for 2600 tons of bridge work, including 600 tons for the electrification of the Chestnut Hill section, Philadelphia. Among public building awards may be mentioned 1200 tons for a hospital at Philadelphia, placed with Morris, Wheeler & Co., and 350 tons for a high school in South Bethlehem, placed with the Guerber Engineering Company. Further structural awards include 600 tons for a building at Reading, Pa., to the Vanderstucken & Ewing Construction Company; 300 tons for the Griswold Worsted

Company, Darby, Pa., to the Levering & Garrigues Company; 1600 tons for the Susquehanna Silk Mill, Thirty-eighth Street and Madison Avenue, awarded to the Empire Structural Steel Company; 600 tons for a loft on East Thirty-third Street, placed with the Passaic Structural Steel Company; 600 tons for the Tischman apartment house on Seventieth Street, awarded to the Hinkle Iron Company, and 600 tons for the Winthrop building, Springfield, Mass., to A. E. Norton, Inc. New offerings from the railroads include 300 tons for small spans for the Baltimore & Ohio; 600 tons for a bridge at Rochester, N. Y., for the Lehigh Valley; 400 tons for the New York Central (half of this in I-beam bridges) and 250 tons for the Erie in Indiana. Among general building inquiries, may be mentioned 1200 tons for the Ten Eyck Hotel, Albany, and 200 tons for an armory at Yonkers, N. Y. Plain material is obtainable from the mills in six or more weeks at 2.119c. to 2.169c., New York, but from the warehouse at 2.60c., New York.

**Steel Plates.**—Demand is insistent, particularly for export, but with so many of the mills filled into the second half, such inquiries get scant consideration, added to the fact that the specifications are sufficiently different literally and in their interpretation to lead plate makers to consider domestic business first. Little or any material can be obtained in less than 8 to 10 weeks, and for such deliveries the minimum now appears to be 2.50c., Pittsburgh. Plates have sold at 3c., Pittsburgh, which is higher than warehouse prices and in some special cases buyers have offered mills as high as 4c. for immediate shipment. We quote mill shipments of plates at 2.669c., New York, and higher in several weeks, 2.169c. to 2.669c., New York, in the third quarter and 2.90c., New York, from warehouse.

**Iron and Steel Bars.**—Bar iron is especially active with the smaller sizes obtainable hardly less than 5 weeks, with the larger sizes obtainable in perhaps 2 weeks less time. The bar iron has been given a \$3 per ton advance and the export demand is sufficiently great to secure even better prices on this business. We quote mill shipments of steel bars at 2.169c., New York, for delivery as the mill can make it and mill shipments of iron bars at 2.419c., New York, in an average of about six to eight weeks. Steel and iron bars from warehouse are quoted at 2.60c., New York.

**Old Material.**—The market for steel scrap and rolling-mill stock continues quiet. Dealers report much of their business in chaotic condition on account of railroad embargoes which are seriously interfering with deliveries. Little expectation is entertained of an improvement in the demand until the railroad situation becomes clearer. Meanwhile, however, prices are being well maintained. Brokers are paying about as follows to local dealers and producers, per gross ton, New York:

No. 1 heavy melting steel scrap.....	\$14.00 to \$14.50
Relaying rails .....	23.50
Relolling rails .....	15.00 to 15.50
Iron car axles .....	25.00 to 25.50
Steel car axles .....	24.00 to 24.50
No. 1 railroad wrought.....	20.00 to 20.50
Wrought-iron track scrap .....	17.50 to 18.00
No. 1 yard wrought, long.....	15.50 to 16.00
No. 1 yard wrought, short.....	14.00 to 14.50
Light iron .....	6.25 to 6.50
Cast borings .....	8.50 to 9.00
Wrought turnings .....	7.50 to 8.00
Wrought pipe .....	13.25 to 13.50
Old carwheels .....	14.00 to 14.50
Malleable cast (railroad).....	12.50 to 13.00

The only enlivening feature about the scrap market is the demand from foundries. Cast scrap is in steady request and occasionally a consumer shows some eagerness to secure a needed supply. Dealers' quotations to consumers of cast scrap are as follows, per gross ton, New York:

No. 1 cast (machinery) .....	\$17.00 to \$17.50
No. 2 cast (heavy) .....	16.00 to 16.50
Stove plate .....	12.00 to 12.50
Locomotive grate bars.....	12.00 to 12.50

**Cast-Iron Pipe.**—The only municipal lettings of importance in sight in this section are those of Pawtucket, R. I., on which bids are to be opened Feb. 9 for 450 tons, and Lewiston, N. Y., Feb. 15, for 500 tons. While public lettings are few and call for comparatively insignificant quantities, the volume of private buying

keeps up splendidly, with fresh inquiries continually coming out. Founders report the past month as one of the best in their history in the aggregate of business booked. Export inquiries are quite numerous, but pipe manufacturers have little hope of closing contracts of this character, partly because of the high prices now prevailing for pipe and partly because of the prohibitory ocean freights asked. Carload lots of 6-in., class B and heavier, continue to be quoted at \$29 per net ton, class A and gas pipe taking an extra of \$1 per ton.

## British Market Still Nominal

### American Billets Sold at High Prices—Shipbuilding Active

(By Cable)

LONDON, ENGLAND, Feb. 2, 1916.

The Cleveland pig-iron market is excited owing to the scarcity of new furnaces going into blast. East coast hematite iron is quoted at 135s. and upward, but this is nominal. Large orders for new ships are being placed. Tin plates are quieter but firm owing to a scarcity of raw material.

American 2 and 3 in. Bessemer billets have sold at £11 10s., c.i.f. Liverpool, for prompt shipment, and 4-in. open-hearth billets at £12 12s. 6d., c.i.f. Liverpool, for delivery from April to June. Quotations for all finished material are nominal. Prices of a few commodities are as follows:

Tin plates, coke, 14 x 20, 112 sheets, 108 lb. f.o.b. Wales,	25s. 6d. to 26s.
Cleveland pig-iron warrants, 85s. 4½d., as compared with	81s. 7½d., last week.
No. 3 Cleveland pig iron, maker's price, f.o.b. Middles-	brough, 76s. 9d.
Steel black sheets, No. 28, export, f.o.b. Liverpool, £19	against £18 a week ago.
Steel rails, export, f.o.b. works port, £11 5s. nominal.	
Hematite pig iron, f.o.b. Tees, about 135s.	
Ferromanganese, f.o.b., £25, loose.	
Ferrosilicon, 50 per cent, c.i.f., £27.	

### A Famine in Billets and Sheet Bars—Little American Steel Obtainable

(By Mail)

LONDON, ENGLAND, Jan. 11, 1916.—The pig-iron market is still in an expectant mood awaiting official announcement of the fixing of prices. The propositions relating to Cleveland pig iron and East Coast hematite, previously given in this correspondence, constituted only a partial solution of the question, because no account has been taken of the Midland and Scotch iron makers, to say nothing of the west coast hematite industry. A number of meetings have been held, but no official pronouncement has yet been made. It is reported that the price of coke in the Midlands has been fixed at either 28s. or 29s. per ton, but the matter is still uncertain and until the position has definitely crystallized no one knows where he stands.

The Scotch pig-iron returns for 1915 are regarded as fairly satisfactory, the output being 1,108,586 gross tons, a decrease of 31,768 tons compared with 1914, while consumption at 985,649 tons showed an increase of 86,909 tons. Exports were 14,744 tons, a decrease of 184,031 tons. The total consumption and exports, therefore, amounted to 1,169,680 tons, while the stocks in the hands of makers are figured at 170,721 tons, a decrease of over 61,000 tons, mostly hematite.

In finished steel, it is expected that prices will go higher if only because the control of raw material is impending and meantime bars are very strong. Opinion is equally divided as to whether there will be an official advance in the price of best grades of material at the quarterly meeting to be held this week. Already, however, a good many of the works are obtaining substantial premiums, and common iron in the Midlands is quoted up to £13 10s. for local delivery.

Semi-finished steel is nominal, makers in most cases refusing to make prices at all. Users of billets and sheet bars are faced with absolute starvation conditions and fancy prices are obtainable wherever material is to be picked up. The supply has been dwindling



for many months and America is not able to give much help. Bessemer basic billets were recently sold at £10 10s. c.i.f., Liverpool, but the Welsh makers ask anything from £11 10s. to £12 for sheet bars and will only sell small lots, even at this figure.

### Inland Steel Company's Earnings

The annual report of the Inland Steel Company, Chicago, being its first report to cover the period of the calendar year, as contrasted with previous reports from July to July, includes the earnings of the first half of 1915 which were also embraced in the report of the company of July 1, last. The statement shows net profits for the year 1915 of \$4,169,104.12 and a surplus, as of Dec. 31, amounting to \$6,708,530.98. Condensed, the income account is as follows:

Net earnings from operations, after deducting charges amounting to \$1,143,365.89 for maintenance and repairs.....	\$4,414,135.21
Other income.....	78,885.38
Total profits.....	\$4,493,024.59
Less—	
Provision for depreciation and renewal of plants.....	\$200,000.00
Provision for exhaustion of minerals.....	123,920.47
	323,920.47
Net profits.....	\$4,169,104.12
Deduct—	
Interest on bonds.....	\$381,690.00
Dividends.....	599,886.00
	981,576.00
Surplus for year.....	\$3,187,528.12
Add surplus as of Dec. 31, 1914.....	3,553,172.86
Total.....	\$6,740,700.98
Less discount and expense in connection with extension and refunding mortgage.....	32,170.00
Surplus Dec. 31, 1915.....	\$6,708,530.98

The condensed balance sheet is as follows:

Assets		
Land, plants and buildings.....	\$17,381,539.52	
Investments.....	295,050.00	
Inventories.....	\$3,537,031.65	
Bills receivable.....	196,321.59	
Accounts receivable.....	2,020,391.12	
Insurance unexpired.....	12,859.62	
Cash.....	1,841,978.17	
Advance royalty on ore.....	7,608,532.15	
	178,900.60	
Total.....	\$25,464,072.27	
Liabilities		
Capital stock.....	\$9,915,016.25	
Bonded debt.....	6,410,000.00	
	16,325,016.25	
Current accounts payable.....	468,165.52	
Current payrolls.....	179,483.43	
Taxes accrued.....	173,214.26	
	820,863.21	
Interest accrued on bonded debt.....	29,250.00	
Reserves.....	1,580,411.83	
Surplus.....	6,708,530.98	
Total.....	\$25,464,072.27	

### German Pig-Iron Output in November

The pig-iron output in Germany in November, 1915, as given officially by *Stahl und Eisen*, was 1,019,122 metric tons against 1,076,343 tons in October, a decrease of 57,221 tons. The November daily rate was 33,970 tons against 34,720 in October, which was the record. In daily output the November rate stands third for the 16 months of the war. The production to Dec. 1, 1915, was 10,760,993 tons against 13,529,666 tons to Dec. 1, 1914. The November production comprised 160,897 tons of foundry iron, 17,736 tons of Bessemer iron, 642,603 tons of Thomas or basic iron, 177,393 tons of steel-making iron and spiegeleisen and 20,493 tons of forge or puddle iron. The November output in 1914 was 788,956 tons.

The Enterprise Mfg. Company, Philadelphia, manufacturer of hardware specialties, is celebrating the fiftieth anniversary of its founding in 1866. Lewis W. Klahr is the only surviving original incorporator, while Harry E. Asbury, as president, and Charles W. Asbury, as vice-president, are sons of one of the founders. The company is distributing a souvenir booklet commemorative of the fiftieth anniversary.

### Iron and Industrial Stocks

NEW YORK, Feb. 2, 1916.

Values of stocks declined rapidly for a few days. The recession was especially noteworthy in those stocks which had come to be regarded as having more or less stability. The decline is attributed to a number of influences, prominent among which are the continuance of foreign sales of American securities held abroad, impending labor troubles, apprehension that President Wilson's utterances on our need of preparedness may have some basis not known to the public, the nomination of an extreme radical for the Supreme Court, all of which were seized by aggressive bears and used to demoralize the stock market as much as possible. On Monday of this week the pressure to sell had spent its force and a recovery set in. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

Allis-Chal., com.. 25½ - 27½	Pipe, com. .... 15¼ - 21
Allis-Chal., pref. 76½ - 80	Pipe, pref. .... 49 - 49½
Am. Can, com... 61 - 64½	U. S. Steel, com. 79½ - 86
Am. Can, pref... 110 - 113½	U. S. Steel, pref. 115½ - 118½
Am. Car & Fdy., com. .... 63½ - 69½	Va. I. C. & Coke 54½ - 57
Am. Car & Fdy., pref. .... 117½ - 118	Westg. Electric. 62 - 68
Am. Loco., com.. 62½ - 66½	Am. Rad., com.. 395 - 400
Am. Loco., pref. 101½ - 103	Am. Rad, pref.. 135 - 136
Am. Stl. Fdries., 53 - 57½	Am. Ship, com. .... 35
Bald. Loco., com. 106¼ - 111½	Am. Ship, pref.. 76 - 80
Bald. Loco., pref. .... 108½	Chic. Pneu. Tool. 71½ - 75
Beth. Steel, com. 450 - 473	Cambria Steel... 70½ - 74½
Beth. Steel, pref. .... 130	Lake Sup. Corp. 9¼ - 9½
Case (J.I.), pref. 86 - 86½	Pa. Steel, com. .... 61
Colo. Fuel..... 42½ - 47	Pa. Steel, pref.. 80 - 80½
Deere & Co., pref. .... 96½	Warwick..... 10¼ - 10½
Gen. Elec..... 168 - 173½	Cruc. Steel, com. 66¼ - 78
Gt. No. Ore Cert. 43 - 47½	Cruc. Steel, pref. 109¼ - 112
Int. Harv. of N. J., com. .... 109 - 112½	Harb-Walk. Refrac., com. .... 80
Int. Harv. of N. J., pref. .... 119¼ - 120	Harb-Walk. Refrac., pref. .... 100¼ - 101
Int. Harv. Corp., com. .... 73	La Belle Iron, com. .... 50 - 52½
Lacka. Steel.... 77½ - 84	La Belle Iron, pref. .... 123½
N. Y. Air Brake. 140¼ - 149	Am. Brit. Mfg., com. .... 31 - 34
Nat. En. & Stm., com. .... 22½ - 27	Can. Car & Fdy., com. .... 65 - 71
Nat. En. & Stm., pref. .... 93 - 95	Can. Car & Fdy., pref. .... 74 - 80
Pitts. Steel, pref. 96 - 96½	Carbon Steel, com. .... 60½
Pressed Stl., com. 53¼ - 59½	Carbon Steel, 1st pref. .... 86 - 88½
Pressed Stl., pref. 101¼ - 104	Central Foundry, com. .... 12 - 13
Ry. Steel Spring, com. .... 38 - 40½	Central Foundry, pref. .... 26
Ry. Steel Spring, pref. .... 99 - 100	Dom. Steel, com. .... 45
Republic, com.. 48¼ - 52¼	Driggs-Seabury. 130 - 150
Republic, pref.. 108 - 108½	Midvale Steel... 63½ - 70
Sloss, com. .... 55½ - 59½	
Sloss, pref. .... 98¼	

### Dividends

The National Lead Company, regular quarterly, 1½ per cent on the preferred stock, payable March 15.

The Brier Hill Steel Company, 1½ per cent on the common stock, payable April 1. This declaration places the stock on a 6 per cent basis for the first time.

The Driggs-Seabury Ordnance Company, on the first and second preferred stocks an aggregate of 3½ per cent and 2 per cent respectively for the period from Sept. 1, 1915, to March 1, 1916; on the common stock at the rate of 5 per cent quarterly, from Jan. 15 to March 1, 1916, amounting to 2½ per cent for this period, payable March 15.

The Cambria Steel Company, regular quarterly, 1½ per cent and extra 1 per cent, both payable Feb. 15.

The Harbison-Walker Refractories Company, ¼ of 1 per cent on the common stock.

The Standard Sanitary Mfg. Company, regular quarterly, 1½ per cent on the preferred and 1½ per cent on the common stock, payable Jan. 27.

The Eastern Steel Company, regular quarterly, 1½ per cent on the first preferred stock, payable March 15.

The Pressed Steel Car Company, regular quarterly, 1½ per cent on the preferred stock, payable Feb. 23.

A cylindrical steel tower, weighing 30 tons, was recently removed at Sheboygan, Wis., to another location to make room for harbor breakwater improvements by United States engineers. It was moved by means of a scow, 35 x 120 ft., towed to the breakwater by a harbor tugboat and transferred to the new location on timber ways. The time consumed was one day for preliminary work, one day for actually moving the tower and one day for disposing of the gear and fastening the tower in place.

## Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb.: New York, 16.9c.; Philadelphia, 15.9c.; Boston, 18.9c.; Buffalo, 11.6c.; Cleveland, 10.5c.; Cincinnati, 15.8c.; Indianapolis, 17.9c.; Chicago, 18.9c.; St. Louis, 23.6c.; Kansas City, 43.6c.; Omaha, 43.6c.; St. Paul, 32.9c.; Denver, 68.6c.; New Orleans, 30c.; Birmingham, Ala., 45c.; Pacific coast, 73.9c. on plates, structural shapes and sheets and 65c. on wrought pipe and boiler tubes. The foregoing rates to the Pacific coast are by rail. The rate via New York and the Panama Canal is 56.9c.

**Structural Material**—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs,  $\frac{1}{4}$  in. thick and over, and zees 3 in. and over, 2c. to 2.25c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in. ....	.10
H-beams over 18 in. ....	.10
Angles over 6 in., on one or both legs. ....	.10
Angles, 3 in. on one or both legs less than $\frac{1}{4}$ in. thick, as per steel bar card, Sept. 1, 1909. ....	.70
Tees, structural sizes (except elevator, handrail, car truck and conductor rail). ....	.05
Channels and tees, under 3 in. wide, as per steel bar card, Sept. 1, 1909. ....	.20 to .80
Deck beams and bulb angles. ....	.30
Handrail tees. ....	.75
Cutting to lengths, under 3 ft. to 2 ft. inclusive. ....	.25
Cutting to lengths, under 2 ft. to 1 ft. inclusive. ....	.50
Cutting to lengths, under 1 ft. ....	1.55
No charge for cutting to lengths 3 ft. and over.	

**Plates.**—Tank plates,  $\frac{1}{4}$  in. thick,  $\frac{3}{4}$  in. up to 100 in. wide, 2c. to 2.50c., base, net cash, thirty days. Following are stipulations prescribed by manufacturers:

Rectangular plates, tank steel or conforming to manufacturers' standard specifications for structural steel dated Feb. 6, 1903, or equivalent,  $\frac{1}{4}$  in. and over on thinnest edge, 100 in. wide and under, down to but not including 6 in. wide, are base.

Plates up to 72 in. wide, inclusive, ordered 10.2 lb. per sq. ft., are considered  $\frac{1}{4}$ -in. plates. Plates over 72 in. wide must be ordered  $\frac{1}{4}$  in. thick on edge or not less than 11 lb. per sq. ft., to take base price. Plates over 72 in. wide ordered less than 11 lb. per sq. ft. down to the weight of  $\frac{3}{16}$  in. take the price of  $\frac{3}{16}$  in.

Allowable overweight, whether plates are ordered to gauge or weight to be governed by the standard specifications of the Association of American Steel Manufacturers.

Extras	Cents per lb.
Gages under $\frac{1}{4}$ in. to and including $\frac{3}{16}$ in. ....	.10
Gages under $\frac{3}{16}$ in. to and including No. 8. ....	.15
Gages under No. 8 to and including No. 9. ....	.25
Gages under No. 9 to and including No. 10. ....	.30
Gages under No. 10 to and including No. 12. ....	.40
Sketches (including straight taper plates), 3 ft. and over. ....	.10
Complete circles, 3 ft. in diameter and over. ....	.20
Boiler and flange steel. ....	.10
"A. B. M. A." and ordinary firebox steel. ....	.20
Still bottom steel. ....	.30
Marine steel. ....	.40
Locomotive firebox steel. ....	.50
Widths over 100 in. up to 110 in., inclusive. ....	.05
Widths over 110 in. up to 115 in., inclusive. ....	.10
Widths over 115 in. up to 120 in., inclusive. ....	.15
Widths over 120 in. up to 125 in., inclusive. ....	.25
Widths over 125 in. up to 130 in., inclusive. ....	.50
Widths over 130 in. ....	1.00
Cutting to lengths under 3 ft. to 2 ft. inclusive. ....	.25
Cutting to lengths under 2 ft. to 1 ft. inclusive. ....	.50
Cutting to lengths under 1 ft. ....	1.55
No charge for cutting rectangular plates to lengths 3 ft. and over.	

**Wire Rods.**—Bessemer, open-hearth and chain rods, \$45, nominally.

**Wire Products.**—Prices to jobbers, effective Jan. 24: Fence wire, Nos. 0 to 9, per 100 lb., terms 60 days or 2 per cent discount in 10 days, carload lots, annealed, \$2.05; galvanized, \$2.75. Galvanized barb wire and staples, \$3.05; painted, \$2.35. Wire nails, \$2.20. Galvanized nails, 1 in. and longer, \$2 advance over base price; shorter than 1 in., \$2.50 advance over base price. Woven wire fencing, 64½ per cent off list for carloads, 63½ off for 1000-rod lots, 62½ off for less than 1000-rod lots.

The following table gives the price per 100 lb. to retail merchants on fence wire in less than carloads, with the extras added to the base price:

	Plain Wire, per 100 lb.						
Nos.	0 to 9	10	11	12	13	14	15
Annealed	\$2.10	\$2.15	\$2.20	\$2.25	\$2.40	\$2.50	\$2.60
Galvanized	3.00	3.05	3.10	3.15	3.20	3.35	3.70

**Wrought Pipe.**—The following are the jobbers' carload discounts on the Pittsburgh basing card in effect from Jan. 20, 1916, on iron and steel black and galvanized pipe, all full weight:

Steel				Iron			
Inches	Black	Galv.		Inches	Black	Galv.	
$\frac{1}{8}$ , $\frac{1}{4}$ and $\frac{3}{8}$ ....	69	43½		$\frac{1}{8}$ and $\frac{1}{4}$ ....	58	32	
$\frac{1}{2}$ .....	73	56½		$\frac{3}{8}$ .....	59	33	
$\frac{3}{4}$ to 3.....	76	60½		$\frac{1}{2}$ .....	63	42	

Lap Weld				Reamed and Drifted			
Inches	Black	Galv.		Inches	Black	Galv.	
2.....	73	57½		1½.....	56	32	
2½ to 6.....	75	59½		1½.....	61	43	
7 to 12.....	71	54½		2.....	62	45	
13 and 14.....	60½			2½ to 4.....	64	48	
15.....	58			4½ to 6.....	64	48	
				7 to 12.....	62	46	

Butt Weld				Butt Weld, extra strong, plain ends			
Inches	Black	Galv.		Inches	Black	Galv.	
1 to 3, butt.....	74	58½		$\frac{1}{8}$ , $\frac{1}{4}$ and $\frac{3}{8}$ ....	65	48½	
2, lap.....	71	55½		$\frac{1}{2}$ .....	70	57½	
2½ to 6, lap.....	73	57½		$\frac{3}{4}$ to 1½.....	74	61½	
				2 to 3.....	75	62½	

Lap Weld, extra strong, plain ends				Butt Weld, double extra strong, plain ends			
Inches	Black	Galv.		Inches	Black	Galv.	
2.....	71	56½		$\frac{1}{8}$ .....	61	48½	
2½ to 4.....	73	58½		$\frac{1}{4}$ to 1½.....	64	51½	
4½ to 6.....	72	57½		2 to 2½.....	66	53½	
7 to 8.....	67	50½					
9 to 12.....	62	45½					

Lap Weld, double extra strong, plain ends				Butt Weld, double extra strong, plain ends			
Inches	Black	Galv.		Inches	Black	Galv.	
2.....	71	56½		$\frac{1}{8}$ .....	61	48½	
2½ to 4.....	73	58½		$\frac{1}{4}$ to 1½.....	64	51½	
4½ to 6.....	72	57½		2 to 2½.....	66	53½	
7 to 8.....	67	50½					
9 to 12.....	62	45½					

Lap Weld, double extra strong, plain ends				Butt Weld, double extra strong, plain ends			
Inches	Black	Galv.		Inches	Black	Galv.	
2.....	71	56½		$\frac{1}{8}$ .....	61	48½	
2½ to 4.....	73	58½		$\frac{1}{4}$ to 1½.....	64	51½	
4½ to 6.....	72	57½		2 to 2½.....	66	53½	
7 to 8.....	67	50½					
9 to 12.....	62	45½					

Lap Weld, double extra strong, plain ends				Butt Weld, double extra strong, plain ends			
Inches	Black	Galv.		Inches	Black	Galv.	
2.....	71	56½		$\frac{1}{8}$ .....	61	48½	
2½ to 4.....	73	58½		$\frac{1}{4}$ to 1½.....	64	51½	
4½ to 6.....	72	57½		2 to 2½.....	66	53½	
7 to 8.....	67	50½					
9 to 12.....	62	45½					

To the large jobbing trade an additional 5 per cent is allowed over the above discounts.

The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized.

**Sheets.**—Makers' prices for mill shipment on sheets, of U. S. standard gage, in carload and larger lots, on which jobbers charge the usual advance for small lots from store, are as follows, f.o.b. Pittsburgh, terms 30 days net, or 2 per cent cash discount in 10 days from date of invoice:

Blue Annealed Sheets		Cents per lb.
Nos. 3 to 8.....		2.50 to 2.60
Nos. 9 to 10.....		2.65 to 2.75
Nos. 11 and 12.....		2.65 to 2.75
Nos. 13 and 14.....		2.65 to 2.75
Nos. 15 and 16.....		2.75 to 2.85

Box Annealed Sheets, Cold Rolled		Cents per lb.
Nos. 10 and 11.....		2.25
No. 12.....		2.25
Nos. 13 and 14.....		2.30
Nos. 15 and 16.....		2.35
Nos. 17 to 21.....		2.40
Nos. 22 and 24.....		2.45
Nos. 25 and 26.....		2.50
No. 27.....		2.55
No. 28.....		2.60
No. 29.....		2.65
No. 30.....		2.75

Galvanized Sheets of Black Sheet Gage		Cents per lb.
Nos. 10 and 11.....		3.75 to 4.00
No. 12.....		3.85 to 4.10
Nos. 13 and 14.....		3.85 to 4.10
Nos. 15 and 16.....		3.95 to 4.20
Nos. 17 to 21.....		4.10 to 4.35
Nos. 22 and 24.....		4.30 to 4.55
Nos. 25 and 26.....		4.45 to 4.70
No. 27.....		4.60 to 4.85
No. 28.....		4.75 to 5.00
No. 29.....		4.90 to 5.15

**Boiler Tubes.**—Discounts on less than carloads, f.o.b. Pittsburgh, freight to destination added, on lap-welded steel tubes, in effect from Jan. 14, 1916, and standard charcoal-iron tubes, effective from Jan. 20, 1916, are as follows:

Lap Welded Steel		Standard Charcoal Iron
1½ in. ....	43	1½ in. .... 38 to 39
1¾ and 2 in. ....	55	1¾ and 2 in. .... 42 to 43
2¼ in. ....	52	2¼ in. .... 39 to 40
2½ and 2¾ in. ....	58	2½ and 2¾ in. .... 46 to 47
3 and 3¼ in. ....	63	3 and 3¼ in. .... 50 to 51
3½ to 4½ in. ....	64	3½ to 4½ in. .... 52 to 53
5 and 6 in. ....	57	5 and 6 in. .... 46 to 47
7 to 13 in. ....	54	

Locomotive and steamship special charcoal grades bring higher prices.

1½ in., over 18 ft., and not exceeding 22 ft., 10 per cent net extra.

2 in. and larger, over 22 ft., 10 per cent net extra.



Metal Markets

The Week's Prices

Cents Per Pound for Early Delivery

	Copper, New York		Tin	Lead		Spelter	
	Lake	Electro-lytic	New York	New York	St. Louis	New York	St. Louis
Jan. 26.....	25.50	25.37½	41.75	6.10	6.00	19.25	19.00
27.....	25.50	25.37½	41.50	6.10	6.00	19.00	18.75
28.....	25.50	25.37½	41.50	6.10	6.00	18.75	18.50
29.....	25.50	25.37½	41.50	6.10	6.00	18.75	18.50
31.....	25.50	25.37½	41.75	6.10	6.00	18.50	18.25
Feb. 1.....	25.50	25.37½	41.62½	6.10	6.00	18.50	18.25

Copper is quiet but firm, with interest centered in foreign requirements. Tin is lower though tin-plate mills are reported to have bought in good-sized quantities. Lead quotations have been held up by the foreign demand, and an advance is now looked for. Spelter is much less active and prices are easier. Spot antimony is scarce and quotations are higher.

New York

Copper.—Since the price of electrolytic went to 25.50c., 30 days, delivered, or 25.37½c., cash, New York, about a week ago, domestic buyers have not been active. Some large foreign inquiries are pending, especially from Italy, and interest is largely centered in the foreign situation. Reports of copper at 26c. have been current, but these apply only to resale lots of spot which were not sufficient in quantity to make the market. Similar lots are reported to have been sold at under 25c. Nearby deliveries of electrolytic are generally held at 25.37½c., cash. Lake is nominal at 25.50c., cash. One large electrolytic producer received an inquiry last week for 9,000,000 lb., but could not consider the business in view of the fact that immediate delivery was wanted. Consumers have plenty of copper under contract, but deliveries have been irregular because of the railroad freight embargoes. Several of the mills in the Naugatuck Valley are known to be short of metal, and one wire plant shut down for a time. Despite the effort of the British Government to restrain the upward tendency of electrolytic at London, the quotation has gone to £124. The Ministry of Munitions has requested consumers to consult it before they purchase any quantity over 50 tons at any price over £100. In the domestic selling trade there is a feeling that copper has gone about as high as it should go. It is pointed out that a slump is bound to come and the higher prices mount the greater will be their fall. The exports of January totaled 20,712 tons.

Copper Averages.—The average price of Lake copper for the month of January, based on daily quotations in THE IRON AGE, was 24.39c., and for electrolytic, 24.17½c.

Tin.—The market has appeared dull and quotations have steadily declined, but a fairly good business is reported to have been done with some of the independent tin-plate mills. The quotation yesterday was 41.62½c. The deliveries into consumption in January total 4452 tons and there was in stock and landing Jan. 31 2401 tons. There was afloat on that day 5517 tons.

Lead.—In this metal, also, the foreign demand has continued to be a sustaining influence. Late last week the market became very quiet and prices were shaded by some of the independent sellers. Business was almost entirely confined to exports or domestic munitions makers. This week there is a better tone, independents appear to have withdrawn from the market and there is talk of an advance. One export inquiry alone called for 10,000 tons. The New York quotation is unchanged at 6.10c. and that at St. Louis is 6c. The January exports totaled 3905 tons.

Spelter.—The market is very dull, no interest being shown in any delivery, and the quotations for prompt have declined to 18.50c., New York, and 18.25c., St. Louis. The situation is distinctly a waiting one, with

few bids or offers. Prime Western is plentiful and it is only the higher grades, such as brass mill special, which are scarce. These are quoted around 21c. to 22c. The exports in January totaled 4677 tons.

Antimony.—The spot market is practically nominal in view of the scarcity of metal available for immediate delivery. Chinese and Japanese grades are quoted at 42.50c. to 43.50c., duty paid.

Aluminum.—Quotations are unchanged at 53c. to 55c. for No. 1 virgin aluminum, 98 to 99 per cent pure.

Old Metals.—The market is very strong and quotations are entirely nominal. Dealers' selling prices are as follows:

	Cents per lb.
Copper, heavy and crucible.....	22.50 to 23.00
Copper, heavy and wire.....	21.50 to 22.00
Copper, light and bottoms.....	18.50 to 19.00
Brass, heavy.....	14.00 to 14.50
Brass, light.....	11.50 to 12.00
Heavy machine composition.....	16.00 to 16.50
No. 1 yellow rod brass turnings.....	14.50 to 15.00
No. 1 red brass or composition turnings.....	14.50 to 15.00
Lead, heavy.....	5.25
Lead, tea.....	5.00
Zinc.....	12.00 to 14.00

Chicago

JAN 31.—A check in the upward movement of prices, with recessions and recoveries, has marked the course of the week's trading. Quotations are about as last quoted, namely: Casting copper, 24½c.; Lake copper, 25½c.; tin, carloads, 42½c.; and small lots, 44½c.; lead, 6.02½c.; spelter, 18.75c.; sheet zinc, nominally, 23c.; Cookson's antimony, 50c.; other grades, 46c. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 18.50c.; copper bottoms, 17.75c.; copper clips, 18.50c.; red brass, 16.75c.; yellow brass, 14.75c.; lead pipe, 5c.; zinc, 13.75c.; pewter, No. 1, 26c.; tinfoil, 34c.; block tin pipe, 38c.

St. Louis

JAN. 31.—Non-ferrous metals have been quite active, closing to-day as follows: Lead, 6.25c.; spelter, 19.50c.; tin, 45c.; Lake copper, 26.50c.; electrolytic copper, 26c.; antimony, Asiatic, 45c. In the Joplin ore district zinc blende fell off about \$7.50 per ton, the range being from \$95 to \$112.50, with the choicest ores bringing \$115. Calamine sold at \$65 to \$75. Lead ore sold at \$80 to \$82.50. The average selling prices of the week's production for the district was: Zinc blende, \$99; calamine, \$75; lead ore, \$79. Miscellaneous scrap metals are quoted as follows: Light brass, 8 50c.; heavy yellow brass, 10.50c.; heavy red brass and light copper, 11.50c.; heavy copper and copper wire, 14c.; zinc, 8.50c.; lead, 4c.; pewter, 24c.; tinfoil, 30c.; tea lead, 3.50c.

An 800-Ton Seamless Cylinder Drawing Press

For producing a seamless steel cup 17 in. in diameter and 25 in. deep from a ¼-in. steel disk 42 in. in diameter, the Hydraulic Press Mfg. Company, Mount Gilead, Ohio, has designed and built an 800-ton hydraulic press. The press, which is installed at the plant of the Prest-O-Lite Company, Indianapolis, Ind., is of the inverted type and is provided with two sets of auxiliary cylinders, one for returning the main pressure ram after the drawing or cupping operation has been performed, while the other operates the blank holder which grips the steel disk as it is forced downward into the cup-forming die located in the lower platen. As the rate at which the main ram returns is approximately ten times the speed of the down stroke, it is pointed out that the output is not decreased by reason of the slow speed at which the main ram travels. After the cup has been formed in this way it is drawn out to its finished dimensions on a smaller press, but having a longer stroke. Before all of the operations connected with the drawing of the cylinders are performed the tank is lubricated on both sides with a special compound similar to that used in turret and automatic lathe work, and when the cup comes from the first press it is annealed before being drawn to greater length.

## OBITUARY

**RICHARD S. BRYANT**, factory manager of the Standard Welding Company, died of cancer at the Post-Graduate Hospital, New York City, on Jan. 28. He



**RICHARD S. BRYANT**

was an authority on automobile rims and invented a number of special types. He organized the Bryant Rim Company, Columbus, Ohio, which was later bought out by the Diamond Rubber Company, Akron. He was then made consulting engineer of the United Rim Company, Akron, which was a holding company for several rim patents owned by the large rubber companies. Later he was employed by the Standard Welding Company as consulting engineer, and quite recently was made factory manager. He was a member of the standards committee of the Society of Automobile Engineers. He was born at Leroy, Kan., Sept. 22, 1869.

**THOMAS B. DUNLAP**, formerly of Philadelphia, died Jan. 24, at his home in Doylestown, Pa., aged 83 years. He served in the Civil War in command of the Twenty-ninth Connecticut Regiment. In the period from 1872 to 1876 he was Philadelphia correspondent of THE IRON AGE. He was also connected with other papers and was the author of a book describing the iron and steel works of the United States. He was a member of the American Institute of Mining Engineers and for years was interested in iron mining and manufacturing in Virginia.

**PATRICK J. CARROLL**, president Bucyrus Steel Castings Company, Ohio Locomotive Crane Company and Carroll Foundry & Machine Company, Bucyrus, Ohio, died Jan. 20 from cerebral hemorrhage, aged 55 years. He was born in Fort Wayne, Ind., and went to Bucyrus in 1881 as a molder. The beginning of the development of his large interests started with the purchase of a modest machine shop in 1892. In addition to the companies named above he was an officer of and largely interested in a number of other Bucyrus companies.

**ALEXANDER SAUNDERS**, president of Saunders Sons, Inc., manufacturer of machinery, died Feb. 1 from pneumonia at his home in Yonkers, N. Y., aged 77 years. Mr. Saunders distributed much of his income to Yonkers charities. He recently gave the site for the new Young Men's Christian Association building. His brother, the late Irvin Saunders, presented to Yonkers the Saunders Trade School.

**THOMAS MORRIS**, founder of the Morris Iron Works, died at his home in Yonkers, N. Y., from a stroke of apoplexy, aged 80 years. He was born in England and came to this country shortly before the Civil War. He retired from business 15 years ago.

**JOHN B. BOOTH** died at his home in Sewickley, Pa., near Pittsburgh, Jan. 29, aged 60 years. He was senior member of J. B. Booth & Co., dealers in iron and steel supplies, 216 Robinson Street, Pittsburgh.

**MARK HOUGH**, proprietor of the Enterprise Iron Works, Woonsocket, R. I., died Jan. 27. He was secretary of the Rathbun Knitting Company and active in other corporations.

**CHRISTOPHER C. BRADLEY, SR.**, long prominent as a foundryman, died Jan. 29, at his home in Syracuse, N. Y., aged 82 years. He retired from active business five years ago.

## Record Exports of Steel and Iron Bars

Steel-bar exports from the United States continue at record-breaking proportions, those for August, September, October and November, 1915, being at the rate of 480,072 gross tons per year, which is more than double any previous year. The following table, compiled from Government statistics, shows relative exports:

	Gross Tons	Gross Tons Per Month
August, 1915	42,327	
September, 1915	37,636	
October, 1915	41,277	40,096
November, 1915	38,783	
11 months ended Nov. 30, 1915	353,970	32,180
11 months ended Nov. 30, 1914	101,005	9,182
10 months ended Oct. 31, 1913	180,931	18,093
Fiscal year ended June 30, 1914	149,112	12,426
Fiscal year ended June 30, 1913	231,091	19,257

The export rate at the end of November of 32,180 tons per month compares with 19,257 tons per month for the record fiscal year of 1913.

The total exports of wire rods and bars for the first 10 months of 1915 amount to 472,806 tons or 50 per cent more than those for the fiscal year of 1913 which were 305,914 tons.

British exports of steel bars have also had a corresponding expansion, due to war demands, the total to Dec. 1, 1915, being 453,426 gross tons against 217,090 tons to Nov. 1, 1913, or more than double.

Bar-iron exports are also greater than at any previous time, as the following table shows:

	Gross Tons	Gross Tons Per Month
August, 1915	4,004	
September, 1915	6,560	4,928
October, 1915	3,383	
November, 1915	5,766	
11 months ended Nov. 30, 1915	35,752	3,250
11 months ended Nov. 30, 1914	4,842	440
10 months ended Oct. 31, 1913	13,455	1,345
Fiscal year ended June 30, 1914	10,300	858
Fiscal year ended June 30, 1913	22,958	1,913
Fiscal year ended June 30, 1910	16,040	1,336

The exports for August, September, October and November were at the rate of 4928 tons per month, which is more than two and one-half times those of the record in the fiscal year of 1913 or 1913 tons per month.

## Stanley Belting Corporation Elects Officers

The Stanley Belting Corporation, 32 to 40 South Clinton Street, Chicago, Ill., announces the election of Charles E. Hathaway, for many years the Chicago manager for J. H. Williams & Co., Brooklyn, N. Y., as president. A. L. Whittemore, formerly with J. H. Williams & Co., and at present representing the Vlcheck Tool Company of Cleveland, and W. N. Best, manufacturer of tar and oil burners, 11 Broadway, New York, becomes vice-president; Mr. Laurence of the home office, secretary, and A. G. List, treasurer. Messrs. Laurence, Hathaway and Whittemore, the former of whom has for some time been most instrumental in introducing the company's line, will have charge of sales. The Stanley belting, which is a solid woven cotton belt, is made by the Sandeman Stanley Belting Company of England, at its works in Dundee and Stanley, Scotland.

## Iron and Steel Electrical Engineers

The next annual convention of the Association of Iron and Steel Electrical Engineers will be held in Chicago, Sept. 18 to 22, inclusive. The directors and officers of the association are as follows: President, W. T. Snyder, National Tube Company, McKeesport, Pa.; first vice-president, F. D. Egan, Pittsburgh Crucible Steel Company, Midland, Pa.; second vice-president, C. A. Menk, Carnegie Steel Company, Munhall, Pa.; secretary, W. O. Oschmann, Oliver Iron & Steel Company, Pittsburgh; treasurer, James Farrington, LaBelle Iron Works, Steubenville, Ohio; O. R. Jones (past president), Youngstown Iron & Steel Company, Youngstown, Ohio, and E. Friedlaender (past president), Carnegie Steel Company, Braddock, Pa.



# Machinery Markets and News of the Works

## ACTIVITY IS SUSTAINED

### Remote Territories Share in Prosperity

#### Foreign Representatives Are Buying in New York—Automobile Industry Continues to Expand—Railroads Not Active Purchasers

The machinery trade continues to operate at high tension in all of its branches. Foreign buying and inquiry has been a notable feature in New York, one inquiry involving cranes valued at nearly \$200,000. Russian, French and Belgian representatives are placing business, the last-named buying for delivery to France with the hope of ultimately transferring the tools to their own country. Meanwhile the domestic demand is good.

In Chicago there is no cessation of demand, and it is noted that activity has spread to the Rocky Mountain district and to the Pacific coast, both of them territories which have been quiet for a long time. The Chicago, Burlington & Quincy Railroad is expected to expend \$750,000 on a new shop at West Burlington, Iowa.

Some inland manufacturers of machine tools are now inserting an embargo clause in their contracts where tools are intended for export, which enables them to make collections on inland shipping documents. Many firms were doing this long before the railroad freight embargoes existed.

The Colt's Patent Firearms Company, Hartford, Conn., recently reported as having placed orders for machine tools, has plans for a four-story concrete building 60 x 175 ft.

One Cleveland machine tool builder has taken an order for 280 lathes for munitions work, delivery to begin in May, and has a further inquiry for 200 similar machines. Plant extensions are calling for many tools in Cleveland, and the New York Central Railroad is among the buyers. The Cleveland Motor Plow Company, incorporated for \$600,000, will build a plant for the manufacture of motor-driven farm implements.

Cincinnati tool builders find that but little business is coming from the railroads, and that business is falling off somewhat, although a large Russian inquiry is still pending. Machinists' strikes are causing some trouble in the vicinity of Cincinnati, although at Hamilton the strike is at an end; also the one which existed in the plant of the Urbana Tool & Die Company, Urbana, Ohio. The Union Chain & Mfg. Company, Seville, Ohio, is expected to purchase power presses, automatic screw machines, etc.

The Stutz Motor Car Company, Indianapolis, Ind., has let a contract for the construction of a four-story addition to cost \$100,000. The Studebaker Corporation is reported to have plans for an assembling plant at Dallas, Texas, to cost \$300,000.

The Ford Motor Company, Detroit, will practically double its plant at an estimated cost of \$6,000,000 to \$7,000,000. The Turner & Moore Mfg. Company, De-

troit, makers of automobile parts, will erect a factory 73 x 300 ft.

The Kearney & Trecker Company, maker of milling machines, West Allis, Wis., has broken ground for a one-story shop addition, 60 x 250 ft.

The Hull Pump & Tank Company, Owensboro, Ky., is in the market for a large variety of machine tools. Shops to be erected at Coster, Tenn., by the Southern Railway will include a main building, 73 x 480 ft., and a machine shop, 51 x 100 ft.

The Alaska Engineering Commission of the United States Government, through its office at Seattle, is in the market for a number of machine tools for delivery to the new Government railroad shops at Anchorage, Alaska.

## New York

NEW YORK, Feb. 2, 1916.

The activity of buyers in behalf of Russia continues a leading feature of the market. Russian officials whose offices are in the Flatiron Building, Broadway and Twenty-third Street, have placed some attractive orders, and others are pending. One of these is for cranes, valued at nearly \$200,000. An order for twenty large turret lathes has been placed. One Russian inquiry calls for about 100 railroad shop tools.

The French Commission, 44 Whitehall Street, has lately placed some orders, and similar action has been taken by the Belgian Commission, 25 Madison Avenue. Purchases made by the latter commission will be delivered in France pending the determination of the war, with the intention of transferring them to Belgium after the war.

The demand from the domestic industrial field holds up in an excellent manner, and more business could be done were it possible to make better deliveries. Makers of cranes are so busy that it is impossible for them to make deliveries on orders of any importance inside of four to five months. The Midvale Steel & Ordnance Company is in the market for twenty 5-ton cranes for one of its ordnance shops.

Among recent buyers of miscellaneous machines have been the Southwark Foundry & Machine Company and the Standard Roller Bearing Company, both of Philadelphia, and the Autocar Company, Ardmore, Pa., which is enlarging its plant. The Venango Mfg. Company, Franklin, Pa., manufacturers of locomotive lubricators, ball joints, etc., is planning to make car heating and lighting equipment which it is now having made in another plant. The American Locomotive Company also has been in the market.

Dealers report that several machine tool builders are behind in their deliveries. Exporters of tools are hampered by the slow deliveries, also by the continued scarcity of ocean freight space.

Announcement is made of the formation of the Habirshaw Electric Cable Company. This corporation is a consolidation of the interests which control the Electric Cable Company, Bridgeport, Conn.; the Habirshaw Wire Company, whose plant is at Yonkers, N. Y., and the wire and cable departments of the Waterbury Company, Brooklyn, N. Y. The officers of the new organization will be Edwin W. Moore, president; R. S. Satterlee, vice-president; J. Nelson Shreve, vice-president and treasurer; and Grenville F. Waterbury, secretary. One of the reasons for this consolidation is to bring about a more efficient distribution of the products of these insulated wire plants by carefully planned division of territory, so as to secure rapid delivery to the purchasers of insulated wire. These companies have shared in the prosperity growing out of an increased demand for wire, which is indicative of business expansion. The Habirshaw Company is one of the oldest wire-making organizations in America. Its property at Yonkers includes four acres of water front, with 30 ft. draught for steamships, private tracks and docks.

The Generator Valve Company, manufacturer of carburetor valves, spark plugs, automobile and motor boat acces-

sories, etc., formerly located at 294 Taaffe Place, Brooklyn, N. Y., has removed to the James Building, a two-story brick factory, 39 x 59 ft., which was erected for its use at 47 Dinsmore Place, in the East New York section of Brooklyn.

The New York Steam Company, 90 West Street, New York, has leased offices in the Foster Building, Fortieth Street and Madison Avenue, to which it will remove. The company is said to have now under way operations involving the expenditure of several million dollars in steam lines to be laid throughout the Grand Central terminal district.

Incorporation papers have been issued to the Crown Oil Company, Syracuse, N. Y., to manufacture petroleum products. W. R. Cahill, C. E. Brown and C. L. O'Shea, Syracuse, are the incorporators. The capital stock is \$50,000.

The Bausch & Lomb Optical Company, Rochester, has completed plans for a factory building 133 x 222 ft., one story, to take the place of a building recently destroyed by fire.

Incorporation papers have been filed by Marchesini & Desprit, Buffalo, to manufacture marble, mosaics, tile, etc. The capital stock is \$30,000, and the incorporators are E. Marchesini, G. Desprit, 112 Church Street, and W. R. Daniels, D. S. Morgan Building, Buffalo.

The Erickson Automatic Electric Water Purifier Company, Brooklyn, N. Y., has been incorporated with a capital stock of \$75,000 to manufacture machinery for purifying water, etc., by G. E. Erickson, 451 Ninth Street, C. E. Peterson and F. Teden, Brooklyn.

Rochester, N. Y., is having plans prepared for a garbage disposal plant to include powerhouse, screenroom, machine shop, etc. Frederick T. Elwood is city engineer.

The Board of Water & Light Commissioners, Lewiston, N. Y., Michael Burke, president, is receiving bids until Feb. 15 for a pump house and two low-lift centrifugal pumps, two high-lift triplex plunger pumps, two electric motors and two oil engines.

The Poughkeepsie Corporation, Poughkeepsie, N. Y., manufacturer of steering wheels, special molding, etc., has let contracts for three two-story buildings which will cost \$100,000. This announcement has been made incorrectly under the name of the Percival Smith Company.

## New England

BOSTON, MASS., Jan. 31, 1916.

The Colt's Patent Fire Arms Company, Hartford, Conn., will build a four-story concrete factory, 60 x 175 ft., on a site west of the East Armory. Plans for another building near the West Armory have been drawn for some time, but the project will not be pushed at this time.

The stockholders of the Windsor Machine Company, Windsor, Vt., have ratified the sale of the business and plant to the National-Acme Mfg. Company, Cleveland, O.

The American Brass Company is contemplating the erection of a power plant near the Coe Brass branch, Torrington, Conn.

The American Fastener Company, Waterbury, Conn., has been incorporated with authorized capital of \$24,000. Charles Josephson is president; John Draher, treasurer; Max Kiessling, secretary.

The Risdon Tool Company, Naugatuck, Conn., has had plans drawn for a one-story addition, 50 x 64 ft., to its factory on Andrew Avenue.

The strike of the laborers of the H. B. Smith Company, Westfield, Mass., has been settled by an agreement that the men shall receive an advance of 25 cents a day and shall not be asked to work overtime. The day men will receive \$2 a day and the night men \$2.25.

The Parsons Foundry Company, Bridgeport, Conn., has sold its foundry buildings at Barnum, Hallett and Helen streets and will build a new foundry at North Washington Avenue and Frederick Street. The company has recently been re-organized and its capital increased. R. E. Parsons, who has been the active head for nearly half a century, has resigned. The new officers are: John W. Cottrell, president; Clarence A. Bilton, secretary and treasurer; and Frederick Rhodes.

The Sidney Birch Company, Mansfield, Mass., has been incorporated with capital of \$15,000 to manufacture and deal in machinery. James A. Potter is president and Sidney Buck, treasurer.

The Brown & Sharpe Mfg. Company, Providence, R. I., will build a one-story addition, 64 x 75 ft., to its No. 5 building.

The Hopkins & Allen Arms Company, Norwich, Conn., which recently let a contract for a one-story addition, have enlarged the contract to call for a four-story building of the same size as the original project.

Charles B. Donle & Sons, Providence, R. I., have been

incorporated with capital of \$10,000 to do hub and die cutting and tool making.

The International Electric Riveter Company, Boston, Mass., has been incorporated with capital of \$150,000. F. P. Kobert, president; J. Harris McDonough, treasurer.

The Lake Torpedo Boat Company, Bridgeport, Conn., has extended its property holdings by purchasing twenty lots of waterfront property adjoining its plant.

Work is nearly completed on the new factory of the Stamford Rolling Mills, Springdale, Conn. It is a brick building of nearly the same size as the main structure. A new power house is also in course of construction, and plans are being made for still another building which will probably be erected the coming winter.

The Newton Mfg. Company is equipping a plant for the manufacture of munitions in the property of the old Atherton Mfg. Company, at Atherton, a suburb of Lowell, Mass.

The Phillips Mfg. Company is equipping a munitions plant at Middlesex Village, Mass.

## Philadelphia

PHILADELPHIA, PA., Jan. 31, 1916.

The Charles McCaul Company, 1715 Sansom Street, Philadelphia, Pa., has been awarded contract for repairs to the foundry of the William Adams Foundry Company, 916 North Ninth Street, Philadelphia, at an estimated cost of about \$1,000.

Loos & Dothard, 1438 South Penn Square, Philadelphia, have been awarded contract for the construction of a two-story brick and concrete building to be erected for the Auto-car Company, Ardmore, Pa. It will be 200 x 300 ft., and cost about \$100,000.

Bids are being taken for a powerhouse for the Philadelphia Institute for Feeble-Minded to be erected at Byberry, Pa. It will be one story, of brick, 39 x 110 ft. Philip H. Johnson, Land Title Building, Philadelphia, is the architect.

The John M. Rogers Works, Inc., Gloucester City, N. J., manufacturer of gages, measuring and special tools, etc., plans to erect a one-story machine shop, 42 x 122 ft., to be fitted with the most modern equipment.

The Republican Motor Sales Company, Philadelphia, has been incorporated with a capital stock of \$5,000 by Louis H. Hyneman, 158 North Twenty-second Street, and others, to operate a garage and repair plant.

Schaum & Uhlinger, Inc., Glenwood Avenue and Second Street, Philadelphia, will erect a three-story brick and reinforced concrete machine shop, 126 x 175 ft., at its Fletcher works.

Permit has been granted for an addition, one story, 28 x 42 ft., to the machine shop of Frank Toomey, Inc., 127 North Third Street, Philadelphia, to cost about \$3,100. W. C. Hyzer, 1230 Marlborough Street, is the contractor.

It is reported that arrangements are being completed for the resumption of the manufacture of its separators on a larger scale by the Sharpless Separator Company, West Chester, Pa. The men who left to go to the plant of the Remington Arms Company at Eddystone have been replaced by new hands.

The Freed Heater Company, Collegeville, Pa., has purchased a plant at Phoebus, Va., to relieve crowded conditions at its main plant. The new plant is near Old Point Comfort, on the Chesapeake & Ohio Railroad, and has shipping facilities nearby. It is in the market for radial drilling machines, tapping machines, sand blast equipment and reaming machines. It is planning to equip and put the plant in operation in 90 days.

The Lansdale Foundry Company, manufacturer of light and medium gray-iron castings, Lansdale, Pa., recently built an addition to its foundry 120 ft. long and a corerom, and is now building a pattern house, 30 x 70 ft. The company has refused munition orders amounting to many thousands of dollars. L. K. Allebach is president and Robert J. Vogel is general manager.

## Baltimore

BALTIMORE, MD., Jan. 31, 1916.

Announcement is made that the Baltimore Sheet & Tin Plate Company will be formed with \$3,000,000 capital by J. E. Aldred, of New York and Baltimore, and other interests of both cities. A plant on the waterfront in or near Baltimore will be constructed and it is planned to have it completed by fall. A large part of the capital has been subscribed, it is stated. All the preliminary plans for organization, the erection of the plant and marketing the product have been made. The enterprise, it is stated, will be the only one of its kind on tidewater.



John J. Carlin, 215 St. Paul Street, Baltimore, has filed plans for a garage 22 x 141 ft., to be built on Rosedale Place near Dukeland Avenue, at a cost of about \$6,000.

Baltimore will be selected as one of the cities in which cold storage plants will be established by the American Consolidated Storages. The announcement is credited to William J. Hogan, president of the Indiana Refrigerating Company, Indianapolis, Ind.

It is planned to have the new Hess Steel Company plant, Biddle Street and Loney's Lane, Baltimore, in operation by March 1.

With \$25,000 capital stock the Rowan Electric Mfg. Company, 208 North Holliday Street, Baltimore, has been incorporated to manufacture an automobile starter, electric switches, frames, magnetic valves, etc. The incorporators are John S. Rowan, Benjamin H. Cram and A. Bradford McDerry.

A plant for the repair and storage of equipment will be established at Colgate Creek, Md., by the Raymond Concrete Pile Company, Munsey Building, Baltimore.

A large order for fly-wheels and driving boxes for locomotives is reported received by the Baldt Steel Company, New Castle, Del., from the Baldwin Locomotive Works.

A permit has been granted the Artillery Fuse Company, Wilmington, Del., to erect three buildings to cost \$13,400. One will be one-story, 67 x 90 ft., and cost \$10,000.

Prices on all kinds of boilers, pumps and engines are being sought by the George A. Boyden Pump Company, Maryland Casualty Building, Baltimore.

Announcement is made by J. W. Weiss, vice-president of the J. M. Raffel Company, box manufacturer, Heath and Clarkson streets, Baltimore, that the Strong Box Company of America, with \$600,000 capital, will be established to make machines for the manufacture of boxes.

## Chicago

CHICAGO, ILL., Jan. 31, 1916.

One of the interesting developments of the past year's demand for second-hand machinery, of which advantage has been taken in no small number of instances, has been the opportunity afforded the manufacturer and small machine-shop operator to close up what would have been impossible business under normal conditions through the sale of his machine equipment. In no previous situation has there been a market for used machines where the condition of machines themselves represented so great a depreciation. In new business for export there has been little let-up and local machinery interests report the securing of a number of orders last week. There is also additional evidence of a general improvement in the business of the Rocky Mountain district and of the Pacific coast. From this section this market has had comparatively little business through a long period. Instead of being further relieved, railroad congestion appears to have been accentuated and some of the embargoes that were removed have been reinstated. As many of the contracts covering export shipments of machinery include an embargo clause, a collection can be made by the shipper upon evidence of the delivery of the machine at shipping point, and while numerous consignments are being held up because of the railroad situation, there is little likelihood of this equipment being released for other delivery. Schedule deliveries from tool builders are being protracted rather than shortened.

The Commercial Furniture Company, Chicago Avenue, Chicago, has had plans prepared for a three-story factory, 125 x 175 ft., to be erected at a cost of \$60,000.

S. Linderoth & Co., Chicago, have completed plans for the building of a one-story garage, 96 x 106 ft., to cost \$20,000 and to be located at East Fifty-fifth Street and Maryland Avenue.

The Consolidated Engineering Company will build a one-story brick factory, 110 x 133 ft., at 2600 Shields Avenue, the cost to approximate \$14,000.

The Cyclone Blow Pipe Company will build a one- and two-story factory, 75 x 120 ft., to cost \$20,000, at 2542 West Twenty-first Street.

F. E. Kelley will build a one-story brick garage, 40 x 100 ft., at 628 North Green Street, Chicago, to cost \$10,000.

The Humboldt Iron Works, Chicago, has been incorporated with a capital of \$5,000 by Sam Adams, 4219 N. Laverne Avenue, Jacob Stein and Morris Glazer.

The Federal Tool Company, Chicago, has been organized with a capital of \$5,000 by George M. Engels, 2212 Lincoln Avenue, A. N. Outten and M. C. Kennicott.

The Charles Stecher Company, Chicago, which recently purchased a factory at 1574 Crossing Street, advises that it

has booked a number of orders for the hand screw machine which it recently put upon the market. In the near future the company will be in the market for some equipment with which to increase its output.

The Packett Motor Car Mfg. Company, St. Paul, Minn., of which Henry H. Orme, president of Henry Orme Sons, founders, will be president, has been organized with a capital of \$150,000. It will manufacture a light delivery truck and will build a factory at once.

The Chicago, Burlington & Quincy Railroad is expected to begin shortly the enlarging and improving of its machine and erecting shops at West Burlington, Iowa. It is reported that a new machine shop will be built at a cost of \$750,000.

The Sealwel Piston Ring Company, Sioux City, Iowa, has been organized with a capital of \$25,000 to manufacture automobile accessories. The incorporators are William S. Warfield, Milton S. Crandall and B. A. Walrath.

## Cleveland

CLEVELAND, OHIO, Jan. 31, 1916.

The demand for machine tools continues heavy. A Cleveland builder has just taken an order for 280 lathes for munition work other than shells, delivery to start in May, and has an inquiry for 200 lathes. Considerable new inquiry is coming out for machine tools for plant extensions in lots of up to a dozen machines. The New York Central Railroad is buying several machines, in addition to orders recently placed. Turret lathes continue in good demand, although no large sized orders are coming out. Some manufacturers are delaying purchases of machines not urgently needed in the hope that prices will ease off later. Foreign inquiry is light. Crane builders are receiving a good volume of orders.

The Frantz-Premier Company, Cleveland, maker of vacuum cleaners and other electrical goods, which has just moved into a new plant on Ivanhoe Road, has had plans prepared for two additional buildings and a power house.

E. H. Blywise, formerly connected with the Monarch Brass Company, Cleveland, has organized the Republic Brass Company to manufacture plumbers' brass goods. It will be located at 1767 East Eighteenth Street, Cleveland.

The Shelby Supply & Mfg. Company, Cleveland, has been incorporated with a capital stock of \$25,000 by M. Perdue, H. H. Beck and others, to build vending machines and supplies.

The Loew Mfg. Company, Cleveland, has had plans prepared for a factory extension, 70 x 105 ft.

The Cleveland Motor Plow Company, Cleveland, has been incorporated with a capital stock of \$600,000. It has purchased a 38-acre site in Euclid and will build a plant to manufacture motor plows and other motor farm implements. Rollin H. White, formerly vice-president of the White Company, Cleveland, heads the company.

The Acme Sheet Metal & Mfg. Company, Cleveland, has been incorporated with a capital stock of \$10,000 by E. P. Schlosser, M. L. Harrington, W. C. Kelly and others.

The Grasselli Chemical Company, Cleveland, has acquired a 125-acre site at Niles, Ohio, on which the erection of a sulphuric acid plant will shortly be started. Other chemicals will be made as conditions warrant.

The Cleveland Lathe & Machinery Company, Cleveland, has been incorporated with a capital stock of \$25,000 by Paul G. Mohler, Milton P. Mathews, James J. Brady and others.

The Republic Mfg. Company, Cleveland, has been incorporated with a capital stock of \$10,000 by H. C. Crowell, W. N. Dulin, J. H. Murphy and others, to manufacture metal specialties.

The Medina Foundry Company, Medina, Ohio, which a few months ago erected a molding room, 120 x 140 ft., will make an addition of the same dimensions to that building. It recently installed gas engines providing 140 hp. and may decide to replace its present 140-hp. steam engine capacity with gas engines. The company has for some time been making fly-wheels for the Ford Motor Company at the rate of 2000 per day. This order has been increased to 3000 flywheels per day.

The Champion Spark Plug Company, Toledo, Ohio, has placed contracts for a six story building, 60 x 120 ft., of reinforced concrete, and a one story addition to its present factory. The extensions will double the size of its plant.

The Toledo Speed Wrench & Tool Company, Toledo, Ohio, recently incorporated with a capital stock of \$75,000, will establish a plant in that city for the manufacture of a special patented wrench and contemplates branch manufacturing plants in San Francisco, New Orleans and New York. J. S. O'Connell is president and general manager; Charles P. Wilson, vice-president; John W. Raab, secretary and Carl Lindecker, treasurer.

At the recent annual meeting of the Seneca Wire & Mfg. Company, Fostoria, Ohio, President J. H. Jones reported that about \$50,000 had been expended the past year in plant extensions and that it is its intention to spend about \$100,000 this year in new buildings and equipment. The erection of one building has been started. The present officers were re-elected.

The Warren Tool & Forge Company, Warren, Ohio, is arranging for an extension to its plant.

The Ironwood Mfg. Company, Bellefontaine, Ohio, has been incorporated with a capital stock of \$50,000 by J. S. Kauffman, Frank L. Adams and others to manufacture agricultural implements.

The Faultless Rubber Company, Ashland, Ohio, will erect a two-story concrete building, the contract for which has been placed with the Hunkin & Conkey Construction Company, Cleveland.

The Solar Metal Products Company, Columbus, Ohio, is enlarging its plant by an extension to its main building, 100 x 250 ft., the contract for which has been placed with the Samuel Austin & Son Company, Cleveland.

The Matthews Boat Company, Port Clinton, Ohio, has been reorganized under the name of the Matthews Company and will make electrical equipment in addition to its line of small boats. The plant will probably be enlarged.

## Indianapolis

INDIANAPOLIS, IND., Jan. 31, 1916.

The Stutz Motor Car Company, Indianapolis, has let a contract for a four-story addition to its plant, to cost \$100,000.

The Indianapolis Light & Heat Company, Indianapolis, has increased its capital stock from \$2,000,000 to \$2,375,000.

The Electric Controller Company, Indianapolis, has been incorporated with \$40,000 capital stock to manufacture electrical controllers. The directors are Herbert E. Welchel, John J. Turner and William E. Munk.

The Art Wares Mfg. Company, Indianapolis, has increased its capital stock from \$10,000 to \$50,000.

The International Money Machine Company has moved from Indianapolis to Terre Haute, Ind.

The Convertible Auto Body Mfg. Company, Indianapolis, has been incorporated with \$25,000 capital stock to manufacture automobile seats. The directors are Bennie F. Cartwright, William O. Cornwell and Jennie Cartwright.

The Sterling Metal Company, Huntington, Ind., recently incorporated, has purchased two and one-half acres as a site for its factory buildings, of which the main structure will be 75 x 150 ft., two stories, of steel and glass. It will manufacture table ware.

The Columbus Foundry Company, Columbus, Ind., has been incorporated to do a general foundry business. William Stables, William Summers and Charles Lensmith are the directors.

The Fire Extinguisher Mfg. Company, Anderson, Ind., has been incorporated with \$25,000 capital stock by James F. Fulton, George W. Davis and Arthur C. Call.

The Honeywell Heating Specialties Company, Wabash, Ind., has been incorporated with \$25,000 capital stock to manufacture heating specialties. The directors are Mark C. and Olive H. Honeywell and Willard L. Huff.

The Common Council, Bloomington, Ind., will receive bids Feb. 14 for two 500-kw. turbine engines, one steam condenser and one motor-driven pump, etc. E. E. Erdman is city clerk.

The Knoblock-Heideman Mfg. Company, South Bend, Ind., has announced an increase in its capital from \$30,000 to \$100,000.

The Climax Machinery Company, Anderson, Ind., has been incorporated with \$10,000 capital stock to manufacture machinery, etc. The directors are Frank L. Tracy, Allen C. Shimer, William W. G. Helm.

The Morrill Cut Stone Company, Bedford, Ind., has been incorporated with \$50,000 capital stock to manufacture cut stone. B. F. Morrill, H. M. Gillman, Jr., and R. L. Mellen are the directors.

The Miko Machinery & Supply Company, Muncie, Ind., has filed preliminary notice for dissolution.

The Marion Bench & Cabinet Company, Marion, Ind., has increased its capital stock from \$30,000 to \$75,000.

The Miller Sales Company, Anderson, Ind., has been incorporated with \$50,000 capital stock to manufacture road machinery, etc. The directors are Brooks E., Harry L. and John B. Miller.

## Milwaukee

MILWAUKEE, WIS., Jan. 31, 1916.

At the close of the first month of the new year, machine-tool builders report not the slightest indication of relief from the high-tension demand for tools. The domestic demand is growing daily and the idea that the slackening of export demand would bring relief has been dispelled. The situation is so well founded that tool builders are undertaking important plant extensions, which, while needed long ago, were put off because there seemed to be no telling when the demand might slump and large investments in additions left idle. Enlargement of metal-working shops generally is reported from all quarters. Increases of capital to accommodate surplus and extensions are frequent. It has been a long time since such great activity has been apparent in this district. All lines are affected. Probably the only disquieting features are the growing shortage of materials and advancing prices on the available supply. Some of the larger establishments are still being furnished on contracts; but what will happen when these expire is a matter of conjecture.

The Kearney & Trecker Company, maker of milling machines, West Allis, Wis., has broken ground for a one-story shop addition, 60 x 250 ft., made necessary by the extraordinary demands upon its facilities. The work is in charge of Klug & Smith, consulting engineers, Mack Block, Milwaukee, who have let the steel work to the Federal Bridge Company, Waukesha, Wis. The works have been operating night and day for many months and no relief is in sight. The completion of the addition will afford only temporary relief, it is believed, as the demand for milling machines is growing instead of slackening and unfilled orders are mounting daily.

The Rhinelander Light & Power Company, Rhinelander, Wis., has increased its capital stock from \$100,000 to \$125,000 and will use the new issue to enlarge its output. E. A. Fordes is president.

The Heating & Power Equipment Company has been incorporated at Milwaukee with \$1,000 initial capital, by F. L. Hutchinson, W. E. Atwater and A. B. Nichols, Jr.

The Northwestern Mfg. Company, Clinton and Madison streets, Milwaukee, manufacturer of motors and dynamos, has increased its capital stock from \$50,000 to \$100,000 to accommodate its growing business. W. S. Smith is general manager.

The Four Wheel Drive Automobile Company, Clintonville, Wis., has increased its capital stock from \$250,000 to \$500,000, the additional issue to be distributed as a 100 per cent stock dividend. A cash dividend of 30 per cent was declared at the annual meeting. The company expended about \$100,000 in works extensions the past year and is now buying a considerable list of tools.

Notice has been given of the foreclosure sale March 7 of the Milwaukee County property of the International Steam Pump Company, located at Cudahy, Wis., and consisting principally of the Power & Mining Machinery Company, absorbed by the International Company in 1909.

A new power plant is included in plans for the new Monroe County insane asylum to be built at Sparta, Wis. H. B. Sowle, chairman building committee, county board, will take sealed bids until Feb. 10. The architects are Parkinson & Dockendorff, La Crosse, Wis.

William Van Lieshout, Kaukauna, Wis., who has completed work on a new garage, will at once undertake the erection of a 40-ft. addition for machine shop purposes.

N. C. Woodin, formerly chief engineer of the International Hoist Company, Antigo, Wis., and H. O. Hafemeister, Antigo, have organized the Hoist & Elevator Mfg. Company, and are establishing a small plant at 2-4 Jackson Street, Oshkosh, Wis. The company will devote its attention principally to the manufacture of contractors' hoisting equipment.

The Klumb Engine & Machine Company, Sheboygan, Wis., has been incorporated under the same style. The capital stock is \$40,000 and the incorporators are Paul, Elmer and Oscar Klumb.

The Hub City Auto Company, Marshfield, Wis., has purchased a building on West Second Street and is remodeling it for garage and repair shop purposes. J. P. O'Connell is manager.

The iron works business conducted for many years at 76-88 Menomonee Street, Milwaukee, by W. Toepfer & Sons, has now been incorporated under the style of the W. Toepfer & Sons Company, with a capital stock of \$50,000. The incorporators are Irwin G. Toepfer, general manager; Emma Toepfer and C. J. Pokorny.

The H. W. Livingston Electric Company has been organized at Milwaukee by H. W. Livingston, for many years associated with the American Electric Company. H. E. Brauns, formerly of the Milwaukee Electric Railway & Light Com-



pany, is associated with Mr. Livingston. Shops and offices have been established at 367 Eleventh Avenue.

The Milwaukee department of public works is preparing to remodel a two-story structure opposite the City Hall into a branch municipal garage and repair shop.

The Stryker Steel Casting Company, Thirty-seventh Avenue and Mitchell Street, Milwaukee, has amended its articles of incorporation to provide for an increase in the capital stock from \$100,000 to \$250,000.

The Marshfield Hardware & Auto Company, Marshfield, Wis., has been incorporated under the same name and Herman Kuethe has become associated with the business. Officers have been elected as follows: President, H. W. Burt; vice-president, Max Wegner; secretary and manager, Louis Trossen; treasurer, Herman Kuethe.

The Morgan Lumber Company, 414 Merritt Street, Oshkosh, Wis., has awarded the general contract for the erection of a wood-working shop, 76 x 220 ft., three stories, to the Fluor Brothers Construction Company, 52 State Street, Oshkosh.

Bids for the erection of a \$375,000 packing house, cold storage and warehouse plant for the Farmers' Co-Operative Packing Company, North Street, Madison, Wis., will be taken about March 1. Plans are being prepared by Gardner & Lindberg, engineers, 140 South Dearborn Street, Chicago. The main building will be of reinforced concrete and brick, 90 x 325 ft., four stories and basement.

The Stilka Iron Works, Algoma, Wis., owned by Joseph Stilka, and Edwin Anderegg, has started a production of automatic pin-setting machines for bowling alleys. No additional machinery will be needed at present.

The W. A. Roosevelt Company, 118 Pearl Street, LaCrosse, Wis., maker of plumbers' and steamfitters' supplies, has awarded contracts for the erection of a shop, warehouse and office building, costing \$50,000. It will be 70 x 100 ft., five stories and basement. Peter Nelson, 1706 State Street, general contractor, is taking bids.

Loper & Loper, Oshkosh, Wis., have broken ground for a garage and machine shop, 54 x 160 ft., two stories, to cost \$18,000.

Max-Wishnefsky, scrap metal, 427-429 Fourth Street, Milwaukee, is preparing to build a warehouse at Thirtieth and Burleigh streets, three stories, of concrete and brick, 50 x 140 ft., to cost about \$14,000.

The Milwaukee Dairy Supply Company, 934 Thirtieth Street, Milwaukee, will build a machine shop at Thirtieth and Burleigh streets, of concrete slab construction, 60 x 120 ft., two stories, to cost \$18,000. The company is in the market for machine tools, including lathes, milling, planing and shaping machines, etc., with individual electric motor drive.

The Milwaukee department of public works will call for bids about Feb. 2 for the erection of a natatorium at Fifth and Hayes avenues, of steel and brick, 50 x 115 ft., two stories and basement, with pump and boiler equipment, to cost \$75,000. Plans are being completed by Charles E. Malig, departmental architect. Fred G. Simmons is commissioner.

Stanley F. Kadow, architect, 988 Kinnickinnic Avenue, Milwaukee, is in charge of plans and erection of a foundry on Clinton Street, south of the Kinnickinnic River, to be 65 x 80 ft., to cost \$10,000. Owner's name withheld and further details not available at this time. Work will be undertaken about March 1.

The Peninsula Automobile Company, Sturgeon Bay, Wis., will erect a garage and machine shop, ell-shaped, 50 x 130 x 50 ft., at Cedar and Garland streets.

The National Belting & Salvage Company, Milwaukee, has been organized by Ely Safer, Samuel N. Parelskin and Thomas S. Safer. The capital stock is \$5,000.

The Allis Chalmers Mfg. Company, Milwaukee, has been awarded a contract for furnishing and installing a 4,000,000-gal. pumping engine in the municipal waterworks at Marshalltown, Iowa.

## Cincinnati

CINCINNATI, OHIO, Jan. 31, 1916.

Orders and inquiries for machine tools have declined sharply the past few days. This applies both to domestic and foreign business, although there is still a large Russian deal under negotiation. Leading tool makers report mostly single tool orders from domestic sources, and very little of this business originates with the railroads. Portable electric drilling machines continue good sellers with the export demand about on a parity with domestic orders.

Some trouble is yet experienced in a few local shops, due to the strike of machinists, but no plant is idle and with probably two exceptions all are operating with larger forces than in normal times. At Hamilton, Ohio, the machinists' strike is at an end, but two or three foundries are still

having trouble. The strike at the plant of the Urbana Tool & Die Company, Urbana, Ohio, has been settled, and a large number of machinists have returned to work. No recognition of the union was made.

Second-hand machinery dealers are doing a fair business, and only the scarcity of machine tools prevents them from reporting the volume of their trade as being without precedent. Wood-working machinery is in good demand, especially in the South.

The Tower Mfg. Company, Cincinnati, expects to increase its manufacturing facilities, and is in the market for automatic wire straighteners, either new or second-hand.

The Regal Machinery Company, 112 West Third Street, Cincinnati, has been incorporated with \$10,000 capital stock by F. P. Moran, and others, to deal in second-hand machinery.

The Highland Body Mfg. Company, Elmwood Place, Cincinnati, has had plans prepared for an addition to its plant for which wood-working equipment will be needed.

The French Brothers Bauer Company, Cincinnati, has tentative plans under way for a refrigerating plant to be erected at Canal and Plum streets.

The Mudlick Distilling Company, Germantown, Ohio, has recently received a large order for alcohol from Europe, and has had plans prepared for an addition to its plant.

The Miller Improved Gas Engine Company, Springfield, Ohio, has let contract to the Concrete Steel Construction Company, Springfield, for an addition to its plant, 72 x 72 ft., two stories, of reinforced concrete.

The Yardlet Screen & Weather Strip Company, Columbus, Ohio, has taken out permit for an addition to its plant, work on which will commence at an early date.

The Atlas Brass Foundry, Columbus, Ohio, has let contract for the necessary equipment to be installed in its new foundry addition.

The Duriron Casting Company, Dayton, Ohio, will make an addition to its foundry on South Ludlow Street, estimated to cost \$5,000. Equipment details are lacking.

The Union Chain & Mfg. Company, Seville, Ohio, has purchased a two-story building directly opposite their present plant, which will give them 15,000 sq. ft. additional floor space to meet their rapidly increasing business. More machinery will be bought, including power press, automatic screw machines, etc.

## Detroit

DETROIT, MICH., Jan. 31, 1916.

Overshadowing in importance all plans recently made public involving additions to Detroit's industries was the announcement made Jan. 27 by the Ford Motor Company that it will practically double the capacity of its already enormous plant during the year. The plans call for an expenditure for buildings, machinery and equipment of between \$6,000,000 and \$7,000,000. While all the details have not yet been made public, it is known that a large foundry, a six-story manufacturing building, 245 x 945 ft., and extensions to the present buildings and machine shops are to be constructed.

The Detroit Edison Company, Detroit, has plans for this year, according to President Dow, involving the expenditure of about \$5,000,000, which include the Connors Creek power house unit, \$1,134,000; Delray power house unit, \$360,000; substations, \$1,040,000; new central heating plant, \$262,000; improvements to Farmer Street heating plant, \$107,000; improvements to Park Place heating plant, \$33,000; other construction, \$145,000.

The Timken-Detroit Axle Company, Detroit, will erect a building to cost \$100,000, to be used for a malleable iron foundry.

The Turner & Moore Mfg. Company, Detroit, manufacturer of large parts for automobiles, is having plans prepared for a factory, 75 x 300 ft. New machinery will be installed, including power equipment.

The Arthur Colton Company, Detroit, manufacturer of special tools and machinery, is erecting an addition to its plant.

The Solvay Process Company, Detroit, manufacturer of soda products, will erect a three-story steel frame factory, to cost \$12,000.

The Detroit Smokeless Stove Company, Detroit, has been incorporated with \$100,000 capital stock, to manufacture stoves. The incorporators are George Schleusselberg, Eugene L. Mistersky and George A. Fritch.

The Michigan Arms Company, Detroit, has been incorporated with \$100,000 capital stock by James W. Peebles, Louis E. Stanley and Frank G. Bayles. It will engage in the metal manufacturing business.

The Motor Truck Body Company, 330 Franklin Street,

Detroit, has begun the erection of a factory, 64 x 245 ft., one story.

The Alter Motor Car Company, Detroit, has increased its capital stock from \$75,000 to \$150,000. It operates an automobile plant at Plymouth, Mich.

The Covell Mfg. Company, Benton Harbor, Mich., manufacturer of castings, is enlarging its plant by the erection of additions 80 x 100 ft. and 32 x 75 ft., respectively. A. W. Filstrup is general manager.

E. A. Field, Grand Rapids, Mich., is at the head of a new company known as the Field Motor Company, organized to manufacture gasoline engines. It will be capitalized at \$100,000.

Gallagher, Hutchinson & Campbell Brothers, Muskegon Heights, Mich., have secured a factory at Marshall, Mich., and will establish a plant to manufacture iron, brass and aluminum castings for automobiles.

The Hoover Ball Company, Ann Arbor, Mich., manufacturer of steel balls and bearings, has let contracts for the erection of two additional manufacturing buildings and an office building.

The Brownwall Gas Engine Company, Holland, Mich., has increased its capital stock to \$50,000 and will enlarge its plant by the erection of a building, 50 x 100 ft., two stories and basement.

The Farmers Auto & Machinery Company, Bay City, Mich., has begun the construction of a plant, 150 x 200 ft., two stories, to cost \$20,000.

The Brownwall Engine & Pulley Company, Holland, Mich., has increased its capital from \$25,000 to \$50,000 and will expand its manufacturing facilities through the erection of a new building.

The Harrow Steel Spring Company, Kalamazoo, Mich., has awarded the contract for the improvements to its plant to cost \$125,000.

## The Central South

LOUISVILLE, KY., Jan. 31, 1916.

While the demand for machine tools and power equipment remains good, manufacturers of special machinery report activity has diminished the past few weeks. It is stated that cancellations of orders for special machinery placed by buyers in the Central South have been rather numerous of late. Whether this is due to difficulty in financing only, or to a change of sentiment regarding the business outlook, is difficult to determine. Many local machinery manufacturers are operating day and night shifts, and overtime is the rule in most of the machine shops.

The C. Lee Cook Mfg. Company, Louisville, has completed enlargements of its plant for the manufacture of lathes, which will now be a regular feature of its line. It also reports a good demand for tools of this kind, especially from abroad. Orders for metallic steam packing, particularly for marine work, are also stronger. The plant is operating 120 hr. a week.

The Hull Pump & Tank Company, Owensboro, Ky., which will equip a plant to manufacture oil-handling machinery, is in the market for automatic, turret and engine lathes, milling machines, planing machines, boring mills, drill presses, gear cutters, grinding machines, polishers, pipe threading and pipe-cutting machines, multiple punches, rolls, riveters, transmission equipment, etc. N. D. Hull, vice-president and general manager, is in charge of purchases.

The Southern Railway has found it necessary to provide a special shop for repairs to its steel cars, and will locate it at the Coster shops near Knoxville. Plans call for a steel main shed 73 x 480 ft., with three tracks extending through it and a work shop 51 x 100 ft., both equipped with overhead power cranes and full complement of machinery and tools. Contract for the main shed has been let to the Virginia Bridge & Iron Company and the material will be fabricated at its Memphis plant. Construction will begin before April 1 and will be completed within six weeks from that date. Other additions to be made to the facilities at Coster shops will include a scrap dock.

The Maysville Cotton Mills, Maysville, Ky., will install additional machinery to cost \$25,000 for the manufacture of cotton twine, warp, clothes-line, etc.

The Kentucky River Power Company, Glowmar, Ky., has announced that work on its large steam power plant, to serve coal mining operations in that territory, will begin in the immediate future.

The Lexington Union Stockyards Company, Lexington, Ky., and the Bluegrass Packing Company, associated firms, have been organized at Lexington with \$40,000 capital stock. An abattoir will be built and equipped with refrigerating and other machinery.

The Nicholasville Waterworks Company, Nicholasville,

Ky., is enlarging the capacity of its pumping station. E. A. Gary is superintendent.

John Freeland, Mt. Sterling, Ky., is equipping a machine and general repair shop.

John A. Walker, Dandridge, Tenn., has purchased the local electric light plant, and is considering plans for the establishment of a hydroelectric plant in connection with it.

The Sevierville Milling Company, Sevierville, Tenn., has announced plans for the equipment of an electric light plant to be operated in connection with the mill.

William Tedder and Thomas Abson, Oliver Springs, Tenn., have purchased a local machine shop, and will enlarge it. They will specialize in repairing coal-mining machinery.

The Clinton Ice Company, Clinton, Tenn., has announced plans for rebuilding its ice factory and planing-mill recently burned with a loss of \$20,000.

The Cave Water Power Company, Cave, Tenn., is operating a 50-hp. hydroelectric plant and will develop it further. J. M. Taylor is in charge.

The John G. Duncan Company, 308 Jackson Avenue, Knoxville, Tenn., is in the market for a 25-hp. gasoline engine.

The DuPont Powder Company, Wilmington, Del., is reported to have purchased control of the Tennessee Copper Company and to have plans for the establishment of an explosive plant at Ducktown, Tenn., in connection with the sulphuric acid plant which the copper company recently installed there.

## Birmingham

BIRMINGHAM, ALA., Jan. 31, 1916.

Electrical appliances are active, owing to installation of hydroelectric plants supplying municipalities, mills and mines. Mixed-feed and flour mills are being built in a considerable number and have established a demand in that quarter. Wholesale machinery dealers report generally satisfactory conditions.

Southern Mfg. Company, Gadsden, Ala., plans a band sawmill, individual electric motors to operate machinery, etc., at a cost of \$10,000.

John M. Stevenson and Benjamin Russell, Alexander City, Ala., have purchased from Dixie Industrial Company 11,000 acres of timber land, leased a six-mile railroad leading to it for six years, and will cut the timber.

The Columbia Kaolin & Aluminum Company, of which Fred S. Swindell, 708 Fourteenth Street, Northwest, Washington, D. C., is president, proposes extensive development of kaolin and bauxite properties near Gordon, Ga. Richard K. Meade, 202 North Calvert Street, Baltimore, Md., has been engaged as engineer to prepare plans. An investment of \$150,000 is proposed.

The Union Mfg. Company, Canton, N. C., manufacturer of dinner pails, etc., capitalized at \$50,000, is erecting a factory, one story, of reinforced concrete. Part of its equipment has been purchased for delivery in February; but it is in the market for gasoline or kerosene engines, stamping machines, presses, small tools and sheet-metal shop supplies. T. J. Woodbridge is general manager.

The Globe Machinery & Barrel Factory, P. O. Box 644, Savannah, Ga., will erect a plant near Savannah for the manufacture of slack barrels. It will also manufacture barrel-making machinery. E. W. Robinson, under whose patents the machinery will be made, is general manager.

The Ingalls Iron Works Company, Birmingham, Ala., manufacturer of structural steel, coal and ore mining machinery, will start the erection of an additional building, 120 x 200 ft., to be used for the manufacture of steel plate. It has purchased practically all the necessary machinery and will do its own structural work. Construction will be started in about 60 days. The total cost will be \$50,000.

## Texas

AUSTIN, TEX., Jan. 29, 1916.

In southern Texas the planting season will have opened in about two weeks. The machinery and tool trade shows signs of improvement. Oil well machinery and equipment demand continues unusually heavy.

The Gulf, Colorado & Santa Fe Railroad, Galveston, plans to spend approximately \$250,000 in improving its water supply system at various points in Texas and Oklahoma. Many new pumping plants will be installed and existing ones enlarged.

D. C. Priddy, Amarillo, and associates, plan to construct pumping plants for supplying Amarillo and Canyon City.

The Texas Company, Houston, which recently increased its capital stock from \$30,000,000 to \$37,000,000, plans to enlarge its oil-refining facilities.



The Cuero Auto Sales Company, Cuero, will install a machine shop.

The Lucey Mfg. Company, Houston, will build a plant for the manufacture of oil well machinery and equipment. It has taken over the Union Iron Works, of Houston, as a nucleus for the proposed plant. Capt. J. E. Lucey is president.

The Pharr Ice, Light & Power Company, Pharr, will install new machinery in plant and enlarge its capacity. Charles Evers is president.

The Studebaker Corporation, New York City, will build an automobile assembling plant at Dallas, to cost about \$300,000.

Eugene J. Russell and associates will expend about \$75,000 in the purchase of machinery for operating a deposit of sulphur near Orla.

## St. Louis

St. Louis, Mo., Jan. 31, 1916.

Machine-tool market conditions are active for all classes of machinery, both new and second hand. Industrially the entire nearby territory is very active and becoming more so every day. Labor is better employed than for years, and this in turn is improving the general situation markedly. Bank rates continue easy and investment money continues to increase in supply. Collections are especially good.

An increase of \$400,000 in the capital of the Lowell Bleachery, Lowell, Mass., will be used in building and equipping the bleachery in St. Louis, for which a site was obtained two years ago. It will be equipped to turn out monthly 250,000 lb. of cloth.

The Security Adding Machine Company, St. Louis, Mo., has been incorporated with a capital stock of \$50,000 by F. W. Quackenboss, Leo Rassieur, Jr., C. A. Marquis and William H. Meyer.

The Gor-Wes Motor Patents Company, St. Louis, Mo., has been incorporated with a capital stock of \$50,000 by Robert Gordon, B. H. Weston and Wyman C. Herbert to manufacture internal combustion motors.

The Brunk Mfg. Company, St. Louis, Mo., has been incorporated with a capital stock of \$14,000 by Charles O. A. Brunk, Eugene W. Brunk and John H. Wolf to manufacture heavy-duty jacks, etc.

The Monsanto Chemical Company, St. Louis, Mo., has increased its capital by \$300,000 to add to its operations.

The Overland Automobile Company, St. Louis, Mo., branch, has acquired a site for the erection and equipment of a building to cost \$250,000, which will be provided with a large repair and assembling shop, including travelling crane, drying and baking ovens, etc.

The A. Wolf Iron & Metal Company, St. Louis, Mo., will utilize most of a \$27,000 increase in capital in adding to its conveying equipment for handling old material.

The Porter Electric Incubator, Kennett, Mo., has been incorporated with a capital stock of \$16,000 by W. B. C. Porter, Lee Shelton and Theophilus Robb to manufacture a patented device.

Chillicothe, Mo., will install one 300-kw. generator direct connected to a De Laval turbine. P. J. Bixon is superintendent.

The electric light plant at Joplin, Mo., will be renovated at a cost of \$100,000. Plans are to be prepared by A. C. Moore, Joplin, consulting engineer.

The Warrenton Electric Light & Power Company, Warrenton, Mo., will equip for the generation and distribution to Wright City, Mo., of a three-phase, 6600-volt current.

The Franklin Mining Company, Duenweg, Mo., will add equipment to its power plant, etc.

The Missouri Lead & Zinc Company, Joplin, Mo., will install a large pumping plant on its mining property to drain mines on 1160 acres of ore land.

The Rock Creek Zinc Company, Versailles, Mo., Fred Van Nostrand in charge, will install pumping and power plant equipment, etc.

W. J. Norris, Chillicothe, Mo., and associates will equip a wood-working plant for the manufacture of gunstocks.

The Miesner Lumber & Mfg. Company, Wittenberg, Mo., will re-equip its burned wood-working plant to manufacture swings, furniture, etc., at a cost of about \$7,000.

The Lake Bayou Gin Company, Lake Bayou, Ark., has been incorporated with a capital stock of \$12,000 by T. R. Kersh, G. W. West and J. W. Hubbard.

The Ardmore Oil & Milling Company, Ardmore, Okla., W. F. Lindsay, manager, will install equipment at once for a four-press hydraulic oil mill as the first unit of its plant.

The Southwestern Public Service Company, Ardmore,

Okla., has been incorporated with a capital stock of \$50,000 by Jake L. Homon of Ardmore, W. F. Kerr of Oklahoma City and F. L. Hamon of Weatherford, Tex., and will equip an electric plant for power and lighting. They have also organized the Southern Pipe Line Company, Ardmore, Okla., with a capital stock of \$50,000.

The Gotebo Light & Power Company, Gotebo, Okla., will install one 25-kva. generating unit and change from direct to alternating current.

Spiro, Okla., will equip a gas engine unit in its electric plant. H. R. Walder is superintendent. They have also organized the Southern Pipe Line Company, Ardmore, Okla., with a capital stock of \$50,000.

The Price Sand Company, Price, Okla., is in the market for sand recovery and electric equipment washed away recently by a flood.

The Oklahoma Soda Water Company, Oklahoma City, Okla., has been incorporated with a capital stock of \$100,000 by J. T. Murphy, Dorsey Moorefield and E. J. Giddings.

The Okolona Creamery Company, Okolona, Miss., H. Taylor manager, is reported in the market for creamery equipment, ice-making machinery, boiler, engine, etc.

The Granada Cotton Compress Company, Falls Building, Memphis, Tenn., will rebuild its burned plant at Holly Springs, Miss., and will install equipment costing about \$25,000 with a daily capacity of 1000 bales.

Oxford, Miss., will install one 150-kw. electric generator and direct-connected engine to cost \$6,000.

The West Monroe Mfg. Company, Monroe, La., will rebuild its wood-working plant recently burned. The new plant will cost about \$50,000.

New Orleans, La., will equip an addition to pumping station No. 3. Bids will be received until March 22. F. S. Shields is secretary of the sewerage and water board, City Hall Annex.

### Catalogs Wanted

Charles F. Hoffman, 514 Fairground Street, Vicksburg, Miss., would like catalogs, prices and other information preliminary to taking agency for gasoline and oil burning engines, pulleys, shafting, dynamos, motors, small ammonia refrigerator plants and attachments such as saws and wood choppers to be operated by power, for use on plantations.

## The Pacific Northwest

SEATTLE, Jan. 25, 1916.

The Alaska Engineering Commission, Bell Street Dock Building, Seattle, will immediately purchase a large quantity of supplies, including lathes, dynamos and other equipment for the new railroad shops at Anchorage, Alaska. It will also purchase 100 tons of supplies for the commissary department, 150 tons of miscellaneous construction tools, 250 tons of explosives and eight barges. The railroad shops will all have electric control, being equipped along the most modern lines, each of the big tools having its own dynamo. The new equipment will cost at least \$10,000, including four lathes, two milling machines, two steam hammers, two drill presses, and a wheel press, with necessary small tools such as vises, lathe chucks, emery wheels and air drills. Electric power for the large tools will be furnished by two 75-kw., 125-volt generators to be sent from the government shops at Panama Canal. Lieut. Frederick Mears, who has charge of the Engineering Commission, is making his headquarters at Anchorage, Alaska.

Lumber mills in Oregon and Washington are now engaged in spirited bidding on an order of 200,000,000 ft. of fir lumber for immediate delivery to the French Government. Competition is very keen, and the price accruing to the mills will probably not exceed \$12 or \$13 per 1000 ft. The Northern Pacific Railway is in the market for between 10,000,000 and 15,000,000 ft. of car-building material.

Bad weather is undoubtedly having a retarding influence, yet the general machinery trade is more active than usual for this time of year. Marine shops continue to be the most important buyers of machine tools, though there are many inquiries from mining and lumber interests and general shops, and more orders would be taken if better delivery could be offered. Few new sawmills are being started, but many improvements are being made in existing plants, and logging engines of various types are in good demand. Some good orders are being booked for mining, dredging and miscellaneous machinery for Alaska; and while mining operations in some nearby districts are hampered by the weather, ore mill and smelter expansion is an important factor.

A large steel building is to be erected shortly at the Tacoma smelter of the American Smelting & Refining Company, to be equipped with powerful cranes and two new furnaces.

A. K. Goldman and Max Finkelstein are starting business as the Rex Metal Works at 1304 Seattle Boulevard, Seattle, and equipment is being installed for the production of babbit metal and other metal products.

A stock of machinery belonging to Fairbanks, Morse & Co., at First and Stark streets, Portland, and valued at about \$50,000, was destroyed by fire Jan. 18, the loss being practically total.

The John A. Roebling's Sons Company has moved its Portland office from the Lumbermen's Bank Building to the Lewis Building.

The Loggers' & Contractors' Machinery Company, Portland, has occupied new quarters at 70 Fourth Street.

The Rogue River Canning Company, Medford, Ore., has increased its capital stock to \$10,000, and will double the capacity of its plant. A new boiler will be installed.

E. E. Johnson, Coquille, Ore., plans to install a 50-hp. motor.

The Oswego Lake Water, Light & Power Company, Portland, Ore., has received franchise to erect a plant in Multnomah County to supply the city of Oswego and other towns. The company plans to begin construction in the early spring.

The Prairie Power Company, Prairie City, Ore., which plans the construction of a power plant in that city at a cost of \$45,000, has been granted permission to appropriate the waters of the John Day River and Warm Springs. Current will be used to light Prairie City, John Day and Canyon City.

Steusloff Bros., Salem, Oregon, plans the construction of a sanitary abattoir and meat packing plant to cost approximately \$40,000. It will be two stories, 40 x 70 ft., of concrete construction.

The project under way by the Montana Flour Mills Company to erect a 1500-bbl. flour mill in Great Falls, Mont., is backed by John D. Ryan, president of the Anaconda Copper Mining Company and the Great Falls Townsite Company. Plans are practically completed, and it is understood contract will be let in the spring.

The Colfax Iron Works, Colfax, Wash., has purchased a site adjoining its plant and will construct new buildings, into which it will move. It manufactures the Carley roller feed mill and does general foundry and machine shop business.

The Anderson Middleton Mill interests in Hoquiam, Wash., have recently purchased five sections of timber lands in the North River Valley, for \$500,000, containing approximately 150,000,000 ft. of timber. The new owners plan to construct several sawmills to cut it.

## Canada

TORONTO, Jan. 29, 1916.

Canada is shipping 1,100,000 shells monthly, according to the official statement from Ottawa. Up to the time that orders valued at \$350,000,000 had been placed, 22,000,000 shells had been shipped.

The Minister of Munitions has appointed C. B. Gordon, Montreal, an additional deputy chairman of the Imperial Munitions Board in Canada.

The Dickson Bridge Works Company, Campbellford, Ont., has received an additional shell contract amounting to \$35,000. The contract calls for 90-lb. shells. The previous order was for 18-lb. shells.

The Bowes Jamieson Foundry Company, Hamilton, Ont., has received a shell order that will keep the plant busy for a year. The order was placed by the British War Office through the Canadian Shell Commission.

It has just been learned definitely that the agricultural implement companies in Ontario had a splendid year in 1915, and that the outlook for 1916 is distinctly promising. The record crop in western Canada stimulated purchasing of ploughs, etc., to a remarkable degree. Most distributing and manufacturing companies had not prepared for a big business, and as a result stocks are very low, necessitating active operations for some time. Meantime a number of them are working on war orders, which promise to keep their plants busy for an indefinite period.

The Volta Mfg. Company, Ltd., Welland, Ont., is in the market for a 14 or 16-in. engine lathe with 8 to 10-ft. bed.

Black Brothers, Ltd., 1115 Homer Street, Vancouver, B. C., is in the market for a metal swedge or beader and carriage hub borer.

The King Beach Mfg. Company, Ltd., Mission City, B. C., is in the market for a 50-hp. steam boiler.

Pumps & Power, Ltd., 224 Abbott Street, Vancouver, B. C., is in the market for drill press; 25 to 50-hp. motor or dynamo, direct current, etc.

Plans have been prepared and building operations will be started in the near future on an addition to the plant of

the American Can Company, Railway Street, Vancouver, B. C., to cost between \$60,000 and \$70,000. It will be of brick, with mill construction, 125 x 145 ft. Bids are being called for. Mr. Scoville, of the company's New York office, will take charge of construction work.

The Vancouver Creosoting Company, Ltd., Vancouver, B. C., will build a plant there to cost \$150,000. J. B. Johnson is a stockholder.

The Munitions & Machinery, Ltd., Sorel, Que., has been incorporated with a capital stock of \$100,000 by William R. McLean, Lachine, Que., Andrew P. O'Connor, Huntingdon, Que., Edward A. D. Morgan, and others, of Montreal, to manufacture munitions, machinery, tools, etc.

The Precision Tool & Machine Company, Ltd., Montreal, has been incorporated with a capital stock of \$50,000 by Henry N. Chauvin, John J. Meagher, James E. Coulin, and others, to manufacture machinery, tools, shells, guns, etc.

The Canadian Bronze Powder Works, Ltd., Montreal, has been incorporated with a capital stock of \$500,000 by Thomas B. Gould, Edwin Coughlan, Montreal; Richard E. Thorne, Westmount, Que., and others, to manufacture bronze powder, etc.

The DeSales Mfg. Company, Ltd., Montreal, has been incorporated with a capital stock of \$100,000 by Jean C. Duhamel, Jacob Y. Fortier, A. W. Muhlstock, and others, to build power plants and generate electricity, power, etc.

Cardiff & Dames, Brussels, Ont., will shortly be in the market for one 20-hp. steam or gasoline engine, etc., for the manufacture of limestone fertilizer.

Collingwood, Ont., will make alterations and extensions to its waterworks plant to cost \$19,000. The work will include the installation of an electric high-lift pump, etc.

The Canada Metal Company, Fraser Avenue, Toronto, has received a permit for the erection of an addition to its plant to cost \$4,000.

The United Gas & Fuel Company, Hamilton, Ont., is considering the construction of a coke oven and gas plant to cost \$2,000,000.

The Garland Mfg. Company, Ltd., Hamilton, Ont., has been incorporated with a capital stock of \$100,000 by Franklin Smoke, 50 Rowanwood Avenue; Neil Sinclair, 102 College Street; James S. Smith, and others, to manufacture machinery, munitions, etc.

The Winnipeg Steamship Company, Ltd., Winnipeg, Man., has been incorporated with a capital stock of \$100,000 to build steamships, etc., by Ernest A. Woodward, Frederick W. Loutwood, Thomas E. Meredith, and others.

The Wilson Munitions, Ltd., Toronto, has been incorporated with a capital stock of \$50,000 by D. English Grant, 44 Woodlawn Avenue; Robert McKay, 632 Traders Bank Building; Melville MacDonald, 38 Carlton Street, and others, to manufacture munitions, shells, etc.

The Algoma Rolling Stock Company, Ltd., Toronto, has been incorporated with a capital stock of \$40,000 by Alexander Taylor, care of the Lake Superior Corporation, Traders Bank Building; Thomas Gibson, 88 Roxborough Street West; Rex E. Nicholson, and others, to manufacture locomotives, cars, machinery, tools, etc.

The McCooe Rail Anchor Company, Ltd., Toronto, has been incorporated with a capital stock of \$40,000 by David J. McCooe, 1495 King Street West; John J. Beck, superintendent of railway stations, Union Station; John R. W. Ambrose, 29 Cliff Road, and others, to manufacture mechanical devices, etc.

The Mahood Drug Company, Ltd., Kingston, Ont., has been incorporated with a capital stock of \$50,000 by John B. Phillips, George W. McGlynn, George W. Mahood, and others, to manufacture surgical and dental instruments.

The City Council of London, Ont., is considering the purchase of a paving plant. H. A. Brazier is engineer.

W. Paquin, 318 St. Julie Street, Three Rivers, Que., is receiving prices and information on steam boilers, hoisting apparatus, wood-working machinery, etc.

## Government Purchases

WASHINGTON, D. C., Jan. 31, 1916.

Bids will be received\* by the Bureau of Supplies and Accounts, Navy Department, Washington, schedule 9253, for one hydraulic pump, and schedule 9262, for two universal grinding machines, all for Washington; schedule 9264, for one surface planing machine and one universal saw bench, both for Newport.

Sealed proposals will be received under schedule 197 until Feb. 4 by the commanding officer, Frankfort Arsenal, Philadelphia, for furnishing two electric cranes.

\*No date set for receiving bids.



